VOL. I. OCTOBER, 1890. NO. 1.

THE MONIST.

MR. A. R. WALLACE ON PHYSIOLOGICAL SELECTION.*

IN 1886 I published a paper entitled "Physiological Selection: an additional suggestion on the origin of species," (Zoölogical Journal of the Linnean Society, Vol. XIX, p. 337). The view there expressed is, briefly, as follows.

Given the facts of heredity and variability, the whole theory of organic evolution becomes neither more nor less than a theory of the causes which determine the breeding of like with like, to the exclusion of unlike. For the more firmly that we believe in heredity with variability as the fundamental principle of organic evolution, the stronger must become our persuasion that segregate breeding (or exclusive mating of like with like) must lead to divergence, while indiscriminate breeding (or free intercrossing of all varieties) must lead to uniformity. So long as there is free intercrossing, heredity makes in favor of fixity of type—or, at most, can permit change only in a single line, where successive generations undergo a continuous improvement, which may give rise to a

* In a private letter to the editor of this magazine Professor Geo. J. Romanes writes: "The article refers to a completely new departure in the theory of evolution, striking in the principle of homogamy, the root-principle of the whole, and in physiological selection, one of the main branches. Yet neither principle has so far been perceived except by Mr. Gulick .... The theory of physiological selection has been better understood in America than in this country; and I should like the naturalists there, who have taken such a warm and appreciative interest in it, to see my reply to Mr. Wallace published in an American periodical."

ladder-like series of species in time. But in order that there should be a tree-like multiplication of species in space, or a simultaneous divergence of type, it is essential that free intercrossing be prevented at the origin, and throughout the development, of each branch. In other words, it is only when assisted by some form of segregation—which determines exclusive breeding of like with like—that heredity can effect arborescent or polytypic, as distinguished from catenated or monotypic, evolution. For the sake of greater clearness, I will call segregation in this sense *homogamy*, or the exclusive mating of individuals which belong to the same variety.

Now homogamy may be secured in a very great number of different ways. Of these the most important, from every point of view, is natural selection. Here the exclusive breeding of like with like is determined by general fitness, and is effected by extermination of the unlike—i. e., the comparatively unfit. Moreover, this process leads to a continuous improvement in the way of adaptation, and in this important respect it stands alone among all the forms of homogamy. Nevertheless, we must note that, unless assisted by some other form of homogamy, natural selection can only produce monotypic evolution; never polytypic. Successive generations may thus continuously mount to higher stages of adaptation on the steps supplied by their own dead selves; but although they may thus give rise to a linear series of species in time, they can never thus give rise to a multiplication of species in space. In order to effect such multiplication, or *divergence* of types, natural selection must be supplemented by some other form of homogamy, which can prevent intercrossing between the equally fit at the origin, and throughout the development, of every separate branch.

Well, as I have said, these other forms of homogamy are very numerous. First we may notice geographical isolation. When a comparatively small portion of a species is thus separated from the rest of its kind, intercrossing is effectually prevented between the two sections; and inasmuch as the general average of specific characters in the isolated section will be somewhat different from that of the other section, heredity will determine that the two sections shall not run parallel in their subsequent lines of evolutionary

history: there will arise an increasing divergence between them, as was first pointed out by the mathematician Delbœuf, subsequently by the naturalist Weismann, and more recently, with greater emphasis, by Mr. Gulick as well as myself.

Again, there is homogamy that arises as a result of sexual preference, or, as I have called it, "psychological selection." It is a matter of observation that the breeding of like with like is often determined among the higher vertebrata by individuals of each variety preferring to mate with other individuals of their own variety; and this is homogamy.

Not to occupy space with any attempt at enumerating all the many forms of homogamy* I will at once pass on to the form which constitutes the subject-matter of the present paper—and the form which, in my opinion, is probably of more importance than any other in the multiplication of species. This is the form of homogamy which I have termed Physiological Selection, or Segregation of the Fit, and Mr. Gulick—who independently perceived the principle—has called Segregate Fecundity.

As my object on the present occasion is to answer criticisms which have been passed on my enunciation of this principle, I do not propose to go into further detail by way of explanation than is necessary in order to render intelligible both the criticisms and my reply thereto. Moreover, this reply is only an abstract of a fuller one which has been prepared for publication in a forthcoming book. Therefore it deals only with the main points. Lastly, I may remark that the criticisms which have hitherto appeared have all been derived from the same source, viz., from Mr. A. R. Wallace; for, although many other naturalists have expressed themselves as more or less opposed to the new theory, or "additional suggestion on the origin of species," they have all done so on the grounds, or for the reasons supplied by Mr. Wallace. Therefore, in dealing with Mr. Wallace's objections, I shall be dealing with the only objections which have thus far been advanced.

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* This has been done in a most careful and exhaustive manner by Mr. Gulick in his papers which have succeeded mine in the publications of the Linnean Society

In order at once to restate the theory of physiological selection, and to do so in a form which cannot be suspected of being in any way influenced by Mr. Wallace's more recent criticisms, I will begin by reproducing the main features of the theory in the words which were employed for this purpose more than three years ago, when I supplied an article to the *Nineteenth Century* in answer to one by him in the *Fortnightly Review*. Moreover, for the most part this restatement of the theory is quoted *verbatim* from my original paper—the differences being due only to the conditions imposed by limits of an article.

The following, then, is quoted from the *Nineteenth Century* for January, 1887:

"According to the Darwinian theory [which, as elsewhere fully explained, the present theory is in no way capable of supplanting, but only of supplementing, and this among other ways, by explaining why it is that some degree of mutual infertility is so general a phenomenon as between allied species—a phenomenon which Darwin expressly regarded as not explicable by the theory of natural selection], it is for the most part only those variations which happen to have been useful that have been preserved: yet, even as thus limited, the principle of variability is held able to furnish sufficient material out of which to construct the whole adaptive morphology of nature. How immense, therefore, must be the number of unuseful variations. Yet these are all, for the most part, still-born, or allowed to die out immediately by intercrossing. Should such intercrossing be prevented, however, there is no reason why unuseful variations should not be perpetuated by heredity quite as well as useful ones when under the nursing influence of natural selection—as, indeed, we see to be the case in our domesticated productions. Consequently, if from any reason a section of a species is prevented from intercrossing with the rest of its species, new varieties of a trivial or unuseful kind might be expected to arise within that section. And this is just what we find. Oceanic islands, for example, are well known to be extraordinarily rich in peculiar species; and this can best be explained by considering that a complete separation of the fauna and flora on such an island permits them to develop varietal histories of their own, without interference by intercrossing with their originally parent forms. We see the same principle exemplified by the influence of geographical barriers of any kind, and also by the consequences of migration. Therefore, given an absence of overwhelming intercrossing, and the principle of what I term independent variability may be trusted to evoke new species, without the aid of natural selection. [Homogamy.]

"Were it not for the very general occurrence of some degree of sterility between even closely allied species and were it not also for the fact, that closely

allied species are not always—or even generally—separated from one another by geographical barriers, we might reasonably attribute all cases of species-formation by independent variability to the prevention of intercrossing by geographical barriers or by migration. But it is evident that these two facts can no more be explained by the influence of geographical barriers, or by migration, than they can be by the influence of natural selection.

"Now, of all parts of those variable objects which we call organisms, the most variable is the reproductive system; and the variations may be either in the direction of increased or diminished fertility. Consequently, variations in the way of greater or less sterility frequently take place both in plants and animals; and probably, if we had adequate means of observing this point, we should find that there is no one variation more common. But, of course, whenever it arises—whether as a result of changed conditions of life, or, as we say, spontaneously—it immediately becomes extinguished, seeing that the individuals which it affects are less able (if able at all) to propagate the variation. If, however, the variation should be such that, while showing some degree of sterility with the parent form, it continues to be as fertile as before within the limits of the varietal form, it would neither be swamped by intercrossing nor die out on account of sterility.

"For example, suppose the variation in the reproductive system is such that the season of flowering, or of pairing, becomes either advanced or retarded. Whether this variation be "spontaneous," or due to change of food, climate, habitat, etc., does not signify. The only point we need attend to is that some individuals, living on the same geographical area as the rest of their species, have demonstrably varied in their reproductive systems, so that they are perfectly fertile *inter se*, while absolutely sterile with the rest of their species. By inheritance there would thus arise a variety living on the same geographical area as its parent form, and yet prevented from intercrossing with that form by a barrier quite as effectual as a thousand miles of ocean; the only difference would be that the barrier, instead of being geographical, is physiological. And now, of course, the two sections of the physiologically divided species would be able to develop independent histories of their own without intercrossing; even though they are living together on the same geographical area, their physiological isolation would lead to their taking on distinct specific characters by independent variations, [or homogamy,] just as is the case with sections of a species when separated from each other by geographical isolation.

"To state this suggestion in another form, it enables us to regard many, if not most, species as the records of variations in the reproductive systems of ancestors. When variations of a non-useful kind occur in any of the other systems or parts of organisms, they are, as a rule, immediately extinguished by intercrossing. But whenever they happen to arise in the reproductive system in the way here suggested, they must tend to be preserved as new natural varieties, or incipient species. At first the difference would only be in respect of the reproductive systems;

but eventually, on account of independent variation, other differences would supervene, and the new variety would take rank as a true species.

"The principle thus briefly sketched in some respects resembles, and in other respects differs from, the principle of natural selection, or survival of the fittest. For the sake of convenience, therefore, and in order to preserve analogies with already existing terms, I have called this principle Physiological Selection, or Segregation of the Fit.

"Let it be noted that we are not concerned either with the causes or the degrees of the particular kind of variation on which this principle depends. Not with the causes, because in this respect the theory of physiological selection is in just the same position as that of natural selection; it is enough for both that the needful variations are provided, without its being incumbent on either to explain the causes which in all cases underlie them. Neither are we concerned with the degrees of sterility which the variation in question may in any particular case supply. For whether the degree of sterility with the parent form be originally great or small, the result of it will be in the long run the same; the only difference will be that in the latter case a greater number of generations would be required in order to separate the varietal from the parent form. [In other words, homogamy due to such physiological isolation is cumulative.]

"The object of this paper being that of furnishing a general answer to criticisms on the hypothesis of physiological selection, I will not occupy space by detailing evidence of that hypothesis, further than is needful for the object just mentioned.* This evidence abundantly proves that the particular kind of variation which the theory of physiological selection requires does take place, (*a*) in individuals, (*b*) in races, and (*c*) in species. Next, the evidence goes on to show that the facts of organic nature are such as they ought to be, supposing it true that this variation has played any considerable part in the differentiation of specific types. In particular, it is shown that the general association between the one primary, or relatively constant, specific distinction (mutual sterility), and the innumerable secondary, or relatively variable, distinctions (slight morphological changes which may effect *any* parts of *any* organisms), of itself indicates that the former has been the original condition to the occurrence of the latter, in all cases where free intercrossing has not been otherwise prevented. For even in cases where the secondary distinctions may be supposed to have induced the primary,—or where morphological changes taking place in other parts of an organic type have exercised a reflex influence on the reproductive system, such that the changed organism is no longer fertile with its unchanged parent form,—even in such cases the theory of physiological selection is available to explain the association in question. For even in these

* The evidence, so far as yet published, may be read by any one who cares to purchase the original paper, which can be obtained from the Linnean Society in a separate form.

cases, notwithstanding that the secondary changes are historically the prior changes, they still depend for their preservation on the principles of physiological selection. These principles have, in all such cases, *selected* the particular kinds of secondary distinction which have proved themselves capable of so reacting on the reproductive system as to bring about the primary distinction, and thus to protect themselves against the destructive power of free intercrossing."

Now for Mr. Wallace's criticism of this theory, as presented in his recently published work on "Darwinism."

Briefly put, he furnishes a numerical calculation, showing that when "the physiological peculiarity is not correlated with any external differences of form or color, or with inherent peculiarities of likes or dislikes leading to any choice as to pairing," even when so large a proportion as ten per cent. of the exceptional variety arises every year in the midst of the species, "it is unable to increase its numbers much above its starting-point, and remains wholly dependent on the continued renewal of the variety for its existence beyond a few years."

This, it must be observed, is a reproduction of the criticism which I answered in 1888; but, as Mr. Wallace ignores that answer, I must now repeat it.

The criticism does not dispute the fact that the required variation in the way of "selective sterility" occurs. Indeed, Mr. Wallace allows that it certainly must be of very general occurrence as between incipient species (or pronounced varieties in a state of nature), seeing that it is of such general occurrence as between allied species when fully differentiated as such. In other words, this variation in the way of selective sterility must be recognised as a very general *fact*, even if it be not regarded as a *condition*, or a *cause*, of specific differentiation. Which is merely another way of saying that the particular variation which is required by the theory in question is admittedly a variation which does occur; and occurs, moreover, in very frequent association with the origin of a new species. But Mr. Wallace's objection to regarding this variation as itself a cause of (or condition to) the origin of a new species is, as we have seen, that the changes must always be greatly against the similar variations of the opposite sexes meeting—i. e., of the "phys-

iological complements" happening to pair. Now, I have already shown, in the *Nineteenth Century* of three years ago, that this criticism can only apply to species the sexes of which unite for every birth; but as Mr. Wallace continues to ignore this important consideration, I will now present it in somewhat more detail.

In considering any "supplementary theory" of the origin of species, it is obviously absurd to disregard the realm of organic nature as a whole, and to fasten attention exclusively upon the part of it where a particular difficulty against the theory may be supposed to lie. As will presently be shown, Mr. Wallace is entirely mistaken in supposing that his particular difficulty does lie against the theory in any part of organic nature; but, even if this could not have been shown, it would not have followed that the theory of physiological selection is inapplicable to *all* the classes of the animal and vegetable kingdoms, because it is taken to be inapplicable to *some*. One might just as well argue against Mr. Darwin's theory of sexual selection on the ground that it cannot be held to apply to the coloration and the sculpture of shells. If either sexual selection or physiological selection were put forward as an *exclusive* theory of the origin of *all* species, this kind of argument would, of course, have been valid; but as the matter actually stands, it is largely irrelevant.

I say *largely* irrelevant, because I do not dispute that there is this much force in it. If the theory of physiological selection can be proved inapplicable to Birds and Mammals (which are the only classes that Mr. Wallace considers in connection with it), its applicability to all other divisions, both of the animal and vegetable kingdoms, would be rendered doubtful; seeing that the process of species-formation appears to have been *everywhere* more or less associated with the occurrence of "selective sterility"; and hence, if in any division of organic nature it could be shown that selective sterility cannot possibly have been a cause of specific differentiation, we might well doubt whether it has been such a cause elsewhere—just as we may doubt whether sexual selection has been a cause of the brilliant colors of birds and butterflies, because we know, that it cannot have been a cause of the equally brilliant

colors of corals and flowers. But, as far as physiological selection is concerned, no such question can arise, as I will presently proceed to show.

First of all, however, it is desirable briefly to indicate the strength of this theory in the parts of organic nature where Mr. Wallace's sole criticism cannot possibly be held to apply—viz., the larger part of the vegetable kingdom, where ovules are fertilised either by insects or by the wind. Here the phenomena of "prepotency" are highly suggestive—not to say, in my opinion, virtually demonstrative—of physiological selection; seeing that, as Mr. Darwin remarks in another connexion:

"There can be no doubt that if the pollen of all these species (of Compositae) could be simultaneously or successively placed on the stigma of any one species, this one would elect with unerring certainty its own pollen. This elective capacity is all the more wonderful, as it must have been acquired since the many species of this great group of plants branched off from a common progenitor." *

Darwin is here speaking of elective affinity in its more fully developed form, as this so often obtains between fully differentiated species. But we meet with all lower degrees of its development—sometimes between "incipient species," or varieties, and at other times between closely allied species. It is then known as "prepotency" of the pollen belonging to the same variety, or species, over the pollen of the other variety or species, when both sets of pollen are applied to the same stigma. This is one form of what I have called physiological selection, and in my view it serves to explain why it is that hybrids between closely allied forms growing on common areas (whether they be called "species" or "constant varieties") are so comparatively rare in nature, even in cases where there is no difficulty in producing hybrids artificially by an intentional exclusion of the pollen belonging to the same form. And I allude to these facts in the present connexion for two reasons. In the first place, they serve to show how entirely irrelevant Mr. Wallace's whole criticism is to the vegetable kingdom, as well as to the majority of aquatic animals. In the next place, they serve to

* *Variation*, etc., Vol. ii.

show how entirely unwarranted is his statement, that "we have at present no evidence whatever" in support of my belief that a physiological incompatibility may affect a whole race or strain. Not only have we the multitudinous cases of prepotency, where the incompatibility is *partial* (or in course of becoming, as Mr. Darwin says in the above quotation, "acquired"); but we have also multitudinous cases where the incompatibility has become *absolute*, both as between closely allied species, and even as between varieties of the same species growing on common areas—as M. Jordan has experimentally proved. Therefore in the above remark we have but an additional example of Mr. Wallace's entire forgetfulness, in the present connexion, of any organisms other than those which belong to the class of Birds or of Mammals.*

Turning, then, to the only parts of organic nature where his criticism can even appear to apply, I have here the sufficiently easy task of proving, that this appearance of application arises wholly and entirely out of Mr. Wallace's misapprehension of the theory against which the criticism is directed. In other words, he is not criticising the theory of physiological selection at all, but merely his own travesty of it. For, as repeatedly stated in my original paper, and again reiterated three years ago in the *Nineteenth Century*, it constitutes no part of my theory to deny the co-operation of other forms of segregate breeding or homogamy. On the contrary, I have always insisted—and Mr. Gulick has proved by calculation—that the more efficient the co-operation of other forms of homogamy, the *greater* must become the importance of the physiological form. Yet, as I trust has already been made fully apparent,

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* It seems scarcely worth while to add that Mr. Wallace is doubly mistaken where he says, "Mr. Romanes's theory of Physiological Selection—which assumes sterility or infertility between first crosses as the fundamental fact in the origin of species—does not accord with the general phenomena of hybridism in nature." In the first place, as shown above, "infertility between the first crosses" is by no means out of accord with "the general phenomena of hybridism in nature"—seeing that all degrees of such infertility, from the slightest perceptible amount of prepotency up to absolute sterility, are of the most general occurrence in nature. In the second place, why Mr. Wallace should suppose that in my view physiological selection can only act as regards first crosses, and not also as regards hybrid progeny, I have no means of surmising.

the whole of Mr. Wallace's criticism (even as regards Birds and Mammals) goes upon the supposition that Mr. Gulick and I believe that, if physiological selection ever acts in any case *at all*, it must necessarily act *alone*. For reasons afterwards to be given, I do indeed believe that in some cases it may act alone (in this differing from Mr. Gulick); but, clearly, whether or not there are any such cases, is a question quite distinct from that touching the validity of a criticism which attributes to our theory the absurd dogma, that segregate breeding which arises from physiological isolation, can never be associated with segregate breeding that may arise from any other form of isolation. And that the whole of Mr. Wallace's criticism collapses when once this correction has been supplied, is proved most effectually by the curious fact that, *after having himself supplied the correction, he reproduces our theory as an original one of his own.* How he can have supposed that I did not entertain the possibility of physiological selection being associated with natural selection, "psychological selection," or any other known form of isolation (excepting only the geographical), I am quite at a loss to understand; seeing that from end to end of my paper I continually refer to such association—especially as regards natural selection. And, if possible, I am still less able to understand Mr. Wallace's carelessness in this connection with reference to Mr. Gulick's paper; because there the belief is repeatedly and most clearly expressed, that without such association, "segregate fecundity" *can never act at all*—which is precisely the theory which Mr. Wallace proceeds to elaborate on his own account.

It is now time to show, by means of quotations, how unequivocal and complete is Mr. Wallace's adoption of our theory:

"The simplest case to consider will be that in which two forms or varieties of a species, occupying an extensive area, are in process of adaptation to somewhat different modes of life within the same area. If these two forms freely intercross with each other, and produce mongrel offspring which are quite fertile *inter se*, then the further differentiation of the forms into two distinct species will be retarded, or perhaps entirely prevented; for the offspring of the crossed unions will be, perhaps, more vigorous on account of the cross, although less perfectly adapted to the conditions of existence than either of the pure breeds; and this would cer-

tainly establish a powerful antagonistic influence to the further differentiation of the two forms.

Now, let us suppose that a partial sterility of the hybrids between the two forms arises, in correllation with the different modes of life and the slight external or internal peculiarities that exist between them, both of which we have seen to be real causes of infertility. The result will be that, even if the hybrids between the two forms are still freely produced, these hybrids will not themselves increase so rapidly as the two pure forms; and as these latter are, by the terms of the problem, better suited to their conditions of life than are the hybrids between them, they will not only increase more rapidly, but will also tend to supplant the hybrids altogether whenever the struggle for existence becomes exceptionally severe. Thus, the more complete the sterility of the hybrids the more rapidly will they die out and leave the two parent forms pure. Hence it will follow that, *if there is greater infertility between the two forms in one part of the area than the other, these forms will be kept more pure wherever this greater infertility prevails*, will therefore have an advantage at each recurring period of severe struggle for existence, and will thus ultimately supplant the less infertile or completely fertile forms that may exist in other portions of the area. It thus appears that, in such a case as here supposed, natural selection would preserve those portions of the two breeds which were most infertile with each other, or whose hybrid offspring were most infertile; and would, therefore, if variations in fertility continued to arise, tend to increase that infertility. It must particularly be noted that this effect would result, not by the preservation of the infertile variations on account of their infertility, but by the inferiority of the hybrid offspring, both as being fewer in numbers, less able to continue their race, and less adapted to the conditions of existence than either of the pure forms. It is this inferiority of the hybrid offspring that is the essential point; and as the number of these hybrids will be permanently less where the infertility is greatest, therefore those portions of the two forms in which infertility is greatest will have the advantage, and will ultimately survive in the struggle for existence."

We have here a full acceptance of the theory of physiological selection. For it is represented, as Mr. Gulick and I have represented, that, if "two forms or varieties" occupying a common area are to undergo further differentiation at the hands of natural selection, it becomes a highly favoring condition to the process that some degree of segregate fecundity should arise (if it has not already arisen) between these two forms or varieties; seeing that "if these two forms freely intercross with each other, and produce mongrel offspring which are quite fertile *inter se*, then the further differentiation of the forms into two distinct species will be retarded, or perhaps entirely prevented." Here the importance of

segregate fecundity, or physiological selection, as a factor in the differentiation of specific types on common areas is *fully recognised;* and the *only* respect in which Mr. Wallace alleges that his view of the matter differs from the view of Mr. Gulick and myself, is in drawing special attention to the part which is played by the infertility, or other "inferiority," of the mongrels. But clearly, this infertility, or other inferiority, of the mongrels, in all cases where it occurs, *is part and parcel of the segregate fecundity of the parent forms.* Whether the segregate fecundity has reference to first crosses alone, or likewise to second crosses, it is segregate fecundity all the same; and the only difference is that for the same degree of segregate fecundity in first crosses, the process of physiological selection will become the more effective in proportion to the degree in which the infertility extends also to second crosses. But I think it is very doubtful whether such infertility (or inferiority) on the part of mongrels can react upon the sexual system of their parent forms, so as directly to increase whatever degree of segregate fecundity may have already arisen between these forms. Does the high sterility of mules and mutes, for instance, tend to diminish the degree of fertility that obtains between horses and asses? The only way in which even an absolute degree of sterility (or other inferiority) on the part of mongrels or hybrids may clearly be seen to operate in this direction, is as a negative condition; not as an active cause. In the proportion that mongrels are impotent with one another, they will not so much compete with their parent forms for food, etc.; and in the proportion that they are impotent with their parent forms, they will not counteract any tendency which the latter may continue to develop in the direction of a still further segregation. If the mongrels are fully vigorous and fully fertile, both *inter se* and with their parent forms, the effect will be to retard, if not altogether to prevent, any further progress of physiological separation between the parent forms; because the free intercrossing of the mongrels with one another, and also with their parent forms, will be continually supplying progeny in which the physiological peculiarity is either attenuated or altogether abolished. But this is quite a different thing from supposing that infertility (or inferiority) of the

mongrels can react upon the generative system of the parent forms, so as to increase in them the physiological peculiarity on which their segregate breeding depends: infertility (or inferiority) of the mongrels is but a negative condition which favors the preservation of further degrees of this segregate breeding, if such further degrees should be induced by any other causes.

Now, it does not appear that Mr. Wallace has clearly perceived this important distinction, because he throughout speaks of "this inferiority of the hybrid offspring as the essential point." Obviously, however, the essential point is the physiological variation in the parent forms, i. e., the original occurrence and subsequent development of infertility between the first crosses. Granting to Mr. Wallace, for the sake of argument, that this development could not proceed at all, were it not for the inferiority of the mongrels; still the inferiority of the mongrels need not be the cause of this development. Therefore it is most incorrect to say, "it must be particularly noted that this effect (i. e., increase of infertility between the parent forms) would result, not by the preservation of the infertile variations on account of their infertility, but by the inferiority of the hybrid offspring." "This effect" must be due to causes which act upon the generative systems of the parent forms, even though such causes might be *counteracted* by the *withdrawal* of the negative condition in question.

I trust, then, it has now been rendered sufficiently clear that, no matter how infertile the hybrid progeny may become, and no matter at how great a disadvantage they may thus (or otherwise) be placed in their struggle for existence with the parent varieties, it is not apparent that their infertility (or their extinction) can ever become the cause of a further increase of infertility arising between their parent forms. Consequently, although this is the cause assigned by Mr. Wallace, when he comes to "the essential point" of showing how it is to act so as to increase cross-sterility between the parent forms, he naïvely substitutes the sentence which I have printed in italics—which assumes a "greater infertility between the two forms" as arising through any other causes that we may choose to suppose. The very thing that his entire argument professes to

explain (i. e., the rise and development of cross-sterility between the parent varieties) is slipped in as granted, or given by other causes than those which are said to explain it.*

Having thus endeavored to make it as clear as I can, that the causes of segregate fecundity, both in its origin and subsequent "increase," must be causes acting on the physiology of the segregating forms themselves, and not the effects of these causes in the character of their mongrel offspring; I must next comment upon the extraordinary idea which underlies the whole of Mr. Wallace's exposition, and which in one place he expressly states. This extraordinary idea is that the theory of physiological selection, as held both by Mr. Gulick and myself, takes no cognizance of the possible effects of cross-sterility in leading to infertility or inferiority on the

* The only conceivable way in which infertility (or other inferiority) of hybrids could react on the sexual system of their parent forms, is one which Mr. Wallace appears to have missed: at all events he has nowhere stated it. This way is as follows. Suppose A and B to be two varieties which produce comparatively infertile hybrids. In the proportion that the hybrids are infertile, or otherwise inferior, it must be a disadvantage to both varieties for individuals belonging to one to cross with individuals belonging to the other, because by so doing they are wasting their time and their energy in propagating comparatively poor offspring—thereby failing to impress their characters on the next generation as effectually as they might have done by pairing homogamously. Hence, those individuals which do pair homogamously will leave a larger number—or better quality—of offspring to the next generation, than is left by those which fail to pair homogamously. Hence, also, in the course of many generations a selective premium will be set on the homogamous pairing, A plus A, B plus B, whether such pairing be due to a sexual instinct or to a sexual incompatibility. For example, if horses and asses were to occupy the same area for a sufficient length of time, it is conceivable that the instinct which many horses now present of preferring asses to their own kind would become obsolete; because the horses or mares which have such an instinct would always fail to leave progeny that could transmit it, while such would not be the case with the horses and mares which preferred to pair homogamously, and so it might be if a physiological instead of a psychological character were concerned. But now observe, if this consideration were adduced, I should not be concerned to dispute it. For, even if such a principle of segregation does obtain, to what category does the principle belong? Clearly it does not belong to natural selection, inasmuch as a mere failure to impress individual characters on the next generation is not a matter of life and death in the struggle for existence. But, no less clearly, it does belong to physiological selection; and therefore, if it be an active principle in nature, it is an additional cause of segregate fecundity in first crosses. Moreover, such a principle, if it ever acts, presupposes some considerable degree of sexual differentiation as already given by some other cause.

part of mongrel progeny. I call this an extraordinary idea, because it appears to me most extraordinary that Mr. Wallace can have read our papers, and then have supposed that he was adding anything to our theory by arguing the points which he does argue in the above quotation. When once this argument is correctly stated, it amounts, as we have just seen, to nothing more than pointing out how a segregate fecundity of first crosses will have a better chance of increasing, if the mongrel progeny are infertile or inferior. But surely this goes without saying; or, if it be said, let it be added that physiological selection, when it thus extends to second crosses, is really or ultimately due to physiological selection as regards the first crosses. If the segregate fecundity of the first crosses is of such a kind, that, besides tending to a physiological isolation of the parent forms, it leads to inferiority of the mongrel progeny; this is merely a further expression of the segregate fecundity in question. Its effect is that of so far extinguishing the influence of progeny in the subsequent history of parental segregation: therefore, its effect is just the same as if, owing to a somewhat higher degree of segregate fertility in the first instance (i. e., in the first crosses), a proportionately smaller number of mongrel offspring had been produced at all. In either case the result (physiological differentiation) is equally due to causes acting on the sexual system of the parent forms; and whether this effect is brought about by a suppression of progeny as to their numbers alone, or likewise as to their efficiency, is quite immaterial to the theory of physiological selection. Which shows once more how wide of the mark is Mr. Wallace's statement, that "the inferiority of the hybrid offspring is the essential point" in any process of sexual segregation. The "essential point" must always be the original occurrence and subsequent "preservation of the infertile variations" arising between the parent forms, whether these variations are only in the direction of producing a smaller number of mongrels, or also in that of suppressing their efficiency when produced.

Upon the whole, then, it is surely the oddest of misconceptions on Mr. Wallace's part that has led him to present the above-quoted "argument" as a substitute for the theory of physiological selec-

tion. As far as it goes, and as far as it is sound, it is the theory of physiological selection pure and simple—neither adding to, nor detracting from it one iota. Nevertheless, the "argument" has not yet gone far enough to embody some of the other elements of the theory. Therefore I will now continue the quotation :

"The differentiation of the two forms into distinct species, with the increase of infertility between them, would be greatly assisted by two other important factors in the problem. It has already been shown that, with each modification of form and habits, and especially with modifications of color, there arises a disinclination of the two forms to pair together; and this would produce an amount of isolation which would greatly assist the specialisation of the forms in adaptation to their different conditions of life. Again, evidence has been adduced that change of conditions or of mode of life is a potent cause of disturbance of the reproductive system, and, consequently, of infertility. We may therefore assume that, as the two forms adopted more and more different modes of life, and perhaps acquired also decided peculiarities of form and coloration, the infertility between them would increase or become more general; and as we have seen that every such increase of infertility would give that portion of the species in which it arose an advantage over the remaining portions in which the two varieties were more fertile together, all this induced infertility would maintain itself, and still further increase the general infertility between the two forms of the species."

Here we perceive that Mr. Wallace, after having adopted the theory of physiological selection in its main elements, next proceeds to supplement that theory (as Mr. Gulick and myself had previously done), by showing how greatly the principle of physiological selection must be assisted by any association with other forms of isolation, or segregate breeding. The only difference between Mr. Wallace and ourselves here is, that while he instances but three or four forms of segregate breeding (or homogamy) with which physiological selection may be associated, I had previously considered several others in addition to these, while Mr. Gulick had gone into the matter still more exhaustively. Therefore, here as elsewhere, I can only account for the character of Mr. Wallace's criticism by supposing that he read our papers inattentively in the first instance, and was afterwards influenced by "unconscious memory" in his subsequent cogitations upon the problem of cross-sterility.

And now, finally, in order to show this still more completely, I

may quote the whole paragraph which concludes his long discussion of that problem:

> The preceding argument, it will be seen, depends entirely upon the assumption that some amount of infertility characterises the distinct varieties which are in process of differentiation into species; and it may be objected that of such infertility there is no proof. This is admitted; but it is urged that facts have been adduced which render such infertility probable, at least in some cases, and this is all that is required. It is by no means necessary that all varieties should exhibit incipient infertility, but only some varieties; for we know that, of the innumerable varieties that occur, but few become developed into distinct species; and it may be that the absence of infertility, to obviate the effects of intercrossing, is one of the usual causes of their failure. All I have attempted to show is, that when incipient infertility does occur in correlation with other varietal differences, that infertility can be, and in fact must be, increased by natural selection; and this, it appears to me, is a decided step in advance in the solution of the problem."

This serves to convey a very accurate summary of the whole "preceding argument"; and it is likewise an admirably concise restatement of the theory of physiological selection. The only points in it to which I object—considered as an epitome of my own paper—are as follows. First, Mr. Wallace has not proved quite so good an advocate as he might have proved, had he looked more closely into the evidence "that some amount of infertility characterises the distinct varieties which are in process of differentiation into species." For although he says, properly enough, that his "preceding argument"— i. e., the theory of physiological selection—"depends entirely upon the assumption" that such infertility does "characterise distinct varieties which are in process of differentiation into species"; still he is wrong in saying it is "admitted" that in favor of this assumption there is "no proof" beyond what he has himself "urged" in the way of "facts which render such infertility probable": there are many other facts which not only render such infertility probable, but prove it to be actual. Secondly, although I quite agree with Mr. Wallace in holding that natural selection must often, as I said in my original paper, "co-operate" with physiological selection, still I must point out that the particular form of segregate breeding to which he here alludes is not natural selection at all; but (as explained in the foot-note to page 15) physiological selection pure and simple

My objections, however, with regard to these two points have no reference to the validity of Mr. Wallace's restatement of my views; and the fact that this restatement has been given with the most incomprehensible unconsciousness that it is a restatement, does not appear to me to detract from the significance of the argumentative suicide in which his entire criticism is thus found to terminate.*

With the self-destruction of this criticism I am left without any other to answer; and I should not have occupied so much space in dealing with this one, were it not that the high estimation in which Mr. Wallace is so deservedly held by all other naturalists is calculated to render almost incredible the peculiar position to which he has eventually gravitated with reference to my views—professing hostility on the one hand, while reproducing them as original on the other. The misunderstanding of my ideas which this state of matters represents, might have led me to wonder whether I could

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*I am the more surprised that Mr. Wallace did not perceive his almost complete adoption of my views in this latest publication of his own, because I had previously had occasion to point out a partial adoption of them in an earlier publication of his on the same subject. The following is what I said upon that occasion—viz., in the *Nineteenth Century*, January, 1888:

"One very obvious and probably frequent instance of what may be termed collective variation in the reproductive system—or a variation due to a common cause acting on many individuals simultaneously—is actually quoted from my paper by Mr. Wallace himself, namely, changes in the season of flowering or of pairing, which insure that any section of a species so affected shall be fertile only within itself. Collective variation of this kind may be directly due to the incidence of some common cause, such as changed conditions of life with respect to food, climate, station, etc.; or, as in the case of bud-variation, it may be due to a single "sport" affecting all the blossoms growing upon the same branch. But besides such direct action of a common cause, it is easy to see that natural selection, use and disuse, etc., by operating in the production of organic changes elsewhere, may not unfrequently react on the sexual system indirectly, and so induce the sexual change required in a number of individuals simultaneously."

Now, in his *Darwinism*, Mr. Wallace again reproduces this instance of "physiological selection," without even yet appearing to perceive that both in my original paper upon the subject and in my answer to his criticism as above quoted, I adduce this particular instance of physiological selection as a typical one. Therefore, when he now says:—"Another mode of isolation is brought about by the variety—either owing to habits, climate, or constitutional change—breeding at a slightly different time from the parent species: this is known to produce complete isolation in the case of many varieties of plants": he is merely restating what I have repeatedly given as an unquestionable case of physiological selection.

possibly have rendered my meaning more clear in the first instance, were it not that this misunderstanding extends in an even greater measure to Mr. Gulick's paper than it does to mine. For seeing that the whole criticism is founded on the erroneous idea that our theory supposes physiological selection always to act alone, the misconception becomes positively ludicrous in its relation to Mr. Gulick's views; seeing that, as previously stated, Mr. Gulick not only agrees with me in holding that physiological selection must be greatly fortified by being associated with any other form of homogamy, but even goes so far as to agree with Mr. Wallace that, unless it is so fortified, it can never act at all. So that, as far as physiological selection is concerned, Mr. Gulick's theory is precisely identical with that of Mr. Wallace, and differs from his statement of it only in recognising a number of forms of homogamy, in addition to natural selection, sexual selection, etc., with which the principle of physiological selection may be associated.

GEORGE J. ROMANES.

THE IMMORTALITY OF INFUSORIA.

THE ingenious hypothesis that Weismann, the eminent Freiburg professor, promulgated several years ago regarding the vitality of all unicellular beings, but more especially of the Protozoans, is undoubtedly widely known. Weismann maintained that the Protozoans were distinguished from the Metazoans, or organisms composed of a number of cells, by the curious property they possessed of exemption from decay and death. The Protozoans exhibited, in the very words of the German savant, an instance of potential immortality;* that is to say, a natural physiological death did not exist for them; if they perished, it was by accident or chance, extraneous to the laws of their organisation. A great many authors have written upon this subject since Weismann, either in support of his opinion, or in refutation of it, and of them we may mention principally Goette,† Minot,‡ and M. Delboeuf.§

It is to be observed that this idea of potential immortality is not the exclusive property of Weismann. We find it clearly indicated by Ehrenberg. And, moreover, as Bütschli remarks, it is so natural that it ought to occur of itself to the mind of every tolerably thoughtful observer that has devoted his time to the study of the biology of these minute creatures.‖

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* *Ueber die Dauer des Lebens.* Jena, 1882.

† *Ueber den Ursprung des Todes*, 1883.

‡ *La Mort et l'Individualité. (Bulletin Scientifique du Nord*, 1884–85.)

§ *La Matière Brute et la Matière Vivante.* Paris 1887.

‖ *Gedanken über Leben und Tod (Zoologische Anzeige*, Vol. v, 1882), cited by M. Maupas in *Multiplication des Infusoires Ciliés—Arch. de Zool. Experimen.*, No. 2, 1888.

Weismann founded his theory in part upon metaphysical, or at least theoretical, considerations, which we deem it useless to discuss at this point. But it is also supported by observed facts, and these facts it will be profitable to recapitulate from the very onset. The idea of the immortality of Infusoria occurs naturally to the mind when one examines with care what happens when an Infusorian reproduces. We know that the reproduction consists in a bipartition of the body of the animal, and that consequently the parent does not die but lives in the two products of its bipartition. In subsequent multiplications the same phenomenon is always observed to occur, so that the entire substance of the parent is found preserved and living in the individuals to which it gives birth. This process Weismann expressed by the emphatic statement: In multiplication by division there are no corpses. It is wholly otherwise with the metazoans, and the reason of this fundamental difference is easily explained by the comparison of the organisation of the body of a metazoan with that of a protozoan. Whereas the protozoan is represented by a single cell that comprehends all the vital functions, the functions of reproduction as well as those of nutrition and relation, the metazoan, on the other hand, is composed of an aggregation, of a colony of distinct cells, among which a division of labor has been effected varying in complexity with the height that the animal has attained in the classificatory scale. It results from this division of labor that in the metazoan certain cells only—those namely which are called the sexual cells—are entrusted with the office of the conservation of the species, while the various other cells are more especially adapted to the conservation of the individual. When a metazoan reproduces, the sexual cells alone enter into activity, and after having suffered various modifications, the principal one of which is fecundation, the sexual cells become the seat of numerous segmentations that go to constitute a new animal distinct from the one that gave it birth. The moment the parent individual ceases to be blended with the individual it produces, it can perish without imperilling the conservation of the species, and thus it is that death appears in the animal kingdom as a logical consequence of division of labor.

We also know that Weismann, in developing these interesting facts, was led with many other naturalists to establish the doctrine that every metazoan may be considered as made up of two entirely distinct groups of cells: 1) of somatic cells, which represent the individual, and which are invested with the care of its nourishment, its sense-mechanism, its movements, and all the functions that have to do with individual life; and 2) of sexual cells, charged with the office of the maintenance of the species in time. Whereas the somatic cells are destined to perish, the sexual cells on the contrary, multiplying by division after the mode of the reproduction of micro-organisms, represent the protozoan type, which is immortal; and, by the intermediary agency of the fecundated ovum, the sexual cells pass from generation to generation, thus forming a material bond between successive generations. Though we have to succumb to death, there is at least a portion of us that ought not to die, from the fact that it is transmittible to our descendants. Naegeli expressed this idea in a felicitous form, when he compared the species to a creeping branch that sent out at successive points annual buds. The buds, which die, are the individuals—that is the somatic group; while the branch that survives after the death of the buds, and which represents the species, is the system of sexual cells. Weismann, finally, has described the same phenomenon by the expression 'continuity of the germinative plasm.'

A great many discussions have arisen with regard to this germinative plasm; for everything touches upon this domain, and Weismann has conceived a theory that endeavors to explain not only the phenomenon of fecundation, but also that of heredity. I cannot mention here the numerous works upon this subject, and refer the inquisitive reader for a knowledge of the same to a series of lectures by Professor Balbiani that I have epitomized in the *Revue Philosophique* for December 1889.

The theory of the potential immortality of the Infusoria has recently been attacked by M. Maupas, whose observations tend to show that natural death, caused by senescence, does obtain among the Infusoria, and that it is comparable in many points of view to the natural death of the metazoans. The researches of M. Maupas

upon the multiplication of ciliate Infusoria are of a relatively recent date, having appeared in 1888 in Vol. VI. of the "Archives de Zoologie Expérimentale."

It is scarcely necessary to say that the ciliate Infusoria can propagate without previous coition. The agamic mode of reproduction appears to be almost the same, save in a few details, as that which follows coition. It consists in a bipartition or division of the body of the animal along a plan. usually perpendicular to the grand axis of the nucleus, and it is a matter of course that that element takes part in the division at the same time with the protoplasm. These phenomena of reproduction it is possible to study upon a grand scale by supplying Infusoria kept in captivity with abundance of nourishment. The easiest way is to produce a putrid fermentation by means of vegetable fragments crushed and macerated in water. The Infusoria contained in this water find abundant food furnished by the bacteria developed in it, and they therefore multiply in great numbers. By means of appropriate methods of treatment and isolation we are able to follow the phenomenon step by step and to examine what the animal actually becomes after each agamic bipartition.

Weismann, when he laid the foundation of his theory of the immortality of Infusoria, supposed that the development of the Infusoria by bipartition had no limits and could be prolonged indefinitely without injury to the vitality of the protoplasm. Various authors had already made observations which were directly in contradiction with this view. M. Balbiani, in 1860, in a communication entitled, "Observations and Experiments upon the Phenomena of Fissiparous Reproduction among Ciliate Infusoria,"* concludes thus: "one of the most important questions . . . . has been to determine whether this mode of propagation is really unlimited, or whether, after being continued throughout a greater or lesser number of generations, it becomes by degrees enfeebled, finally to disappear completely. . . . . We have established that this mode of propagation has its limits, and ends invariably in one of the

* *C. R. Acad. des Sciences.* Vol. iv. p. 1191.

three following ways: either by the *natural* and almost simultaneous *death* of all the individuals belonging to the same cycle, or by the recurrence of sexual generation leading to the termination of one of the cycles and the commencement of a new cycle, or finally by the phenomenon of encystment, which in fact brings about only a momentary interruption of the process of reproduction by fissiparity." M. Balbiani, apropos of this subject, has called attention to a curious observation made by the celebrated Danish micrographer O. F. Müller, who lived in the last century. Müller had observed that the individuals of any one species most ordinarily found in coition were almost all of small stature But he took them for the young individuals of the species. Now these individuals of small size are in reality the oldest, that is to say, they are the ones that are the result of a great number of successive bipartitions; and it is to be observed, that, in a great many species, in proportion as the bipartitions increase the size of the Infusoria decreases.

In fine, without further concerning ourselves with the history of this question, we see that according to M. Balbiani the agamic reproduction of Infusoria has its limits, and that, when coition, that is to say fecundation, does not intervene, it may terminate by the natural death of the individuals or in certain species by encystment.

The chief new element contained in the recent researches of M. Maupas, which were made twenty years after the date of the preceding investigations, consists in his study of the various phenomena of senescence that the Infusoria after a long series of bipartitions present. M. Maupas has established that there exists in the Infusoria no part, no element, that by itself and by its own faculties, can live and be maintained indefinitely. The first outward sign of degeneration is manifested in a reduction of size. The individuals, according as the number of generations increases, become smaller and smaller. With *Stylonichia pustulata*, which in the normal state measures one hundred and sixty μ, the size of the body is seen gradually to fall to one hundred and thirty-five, one hundred and ten, seventy, and even to forty μ. When the effects of senescence

become marked, the animal in its external organs undergoes atrophies and new and more profound degenerations. In *Stylonichia pustulata* the vibratile buccal apparatus becomes gradually atrophied and partly disappears, and in all species the body is reduced and becomes more and more shrunken, assuming forms and contours very far removed from the specific type. The degeneration of the nuclear apparatus at once begins. The first modifications affect the accessory or attendant nucleus, a cut of which will be found at page 118 of my work on Micro-organisms,* and of which the principal function seems to be the maintenance and conservation of the species, and which, therefore, ought to be considered as the real substratum of the immortal plasma. Far from enjoying the attribute of eternal youth, the accessory nucleus seems on the contrary to be affected with a weakness greater and more premature than that of the other parts of the organism. In fact it is this organ that is first atrophied and that disappears under the influence of senile degenerescence. Then, in its turn, the principal nucleus is affected. It takes, according to the species, a different form. Now it diminishes in volume, now it divides into two minute bodies that assume irregular contours, and at other times it assumes a ribbon-like shape.

It is interesting to note that even after the disappearance of the accessory nucleus, whenever the principal nucleus still subsists, the Infusoria continue to live and divide by fission. This life, says M. Maupas, has some features of abnormality about it, since it has become wholly purposeless. The animals still live an individual life, but they are dead to the life of the species.†

In concluding upon this point, I must mention the reservations that may be entertained with regard to the exactitude of the preceding observations and the value of the method employed in their attainment. A competent critic has remarked that it is difficult to assume that nine hundred and thirty-five specimens of the genus *Stylonichia* could find the gases necessary for the support of life,

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* English translation by The Open Court Pub. Co., Chicago. Longmans & Co., London. † Page 262.

seeing that M. Maupas kept them under the same stage where they only had at their disposal a mass of water equal to one hundred cubic millemetres; and it may thus be asked whether the phenomena of senescence produced under these special conditions were not pathological. This criticism seems to be especially strengthened by the fact, that according to M. Maupas, the animalcula placed beneath the shield, all finally congregate at the edge of the preparation, evidently to seek there the air of which they are in need.

If we took our stand, however, upon the facts before cited we could conclude without hesitation that the celebrated thesis of Weismann regarding the immortality of the ciliate Infusoria had been overthrown. But the phenomena are not presented with this simplicity. When the vitality of the Infusoria has become weakened by a considerable number of agamic reproductions, and the animalcule is upon the point of dying a natural death, a new biological phenomenon can intervene, rejuvenating the animal and rendering it capable of reproducing itself anew for a long series of generations. That phenomenon is fecundation.

* * *

In our work upon Micro-Organisms we have spoken at length of the material process of fecundation in ciliate Infusoria, and of the phenomena preliminary to it, following as our guide the observations of Balbiani, Gruber, Bütschli, and Engelmann. It will be necessary to recur here to that subject and to supplement our preceding exposition with some important details. Moreover, recent researches, added to other older ones, afford us interesting information with regard to the conditions and determining causes of conjugation and also of the significance of fecundation itself.

We have seen above that according to M. Balbiani an active period of agamic bipartition in Infusoria can terminate in a period of conjugation; a circumstance which produces in effect a cyclical alternation between agamic generations and a sex-generation. The very word cycle is used in the observations of M. Balbiani. M. Maupas elevated this observation of M. Balbiani to the rank of a method; using, in order to procure the great number of coitions necessary for his investigations, the following process. He

placed the Infusoria in water in which he had produced a putrid fermentation. The Infusoria, thanks to the abundance of the nutriment developed in great numbers. While thus swarming they were lifted out with a drop of water, which was kept upon the stage in a moist chamber. The Infusoria there continued to grow larger and multiply; but by reason of their great numbers it was not long before they exhausted the food brought with them in the drop of water. When the last remains of their nutriment had disappeared they were seen in the majority of cases to seek each other and to copulate.

According to M. Maupas, it is not solely the weakness produced by a series of bipartitions, but, in addition to that and more particularly, the scarcity of food, that excites in the ciliate Infusoria the conjugal appetite. The epidemics of conjugation of which the authors speak, are not otherwise explainable. M. Maupas even says, that when a number of pairs are about to copulate, it is only necessary to give them food to put an end to their conjugation. Scarcity, that author further remarks, ought evidently not to modify in any essential the internal organic state of the Infusoria in question; no more indeed than the opposed condition, that is, an abundance of rich food (page 403 of his memoir). But in the first case they copulate without any ado; in the second, they refuse to do so entirely. Rich alimentation deadens the conjugal appetite; fasting, on the contrary awakens and excites it. There exists moreover, according to the author last mentioned, in ciliate Infusoria, a particular period beyond which fecund coitions cannot take place. It is what he calls the period of karyogamic maturity. Thus, in *Leucophrys*, for example, fecund coitions are observed to take place only after the three-hundredth generation. Before that time the Infusoria may be placed in all the other conditions favorable to copulation, without being seen to contract a single union. On the other hand, beyond that time, a period extends in which numerous coitions are obtained. Although, indeed, the cyclical alternation of agamic generations and copulations is indisputable, further researches are still necessary to obtain a thorough knowledge of the extent of these cycles. It is certain that their duration varies in the

different species, and perhaps, in conditions as yet imperfectly known, may in any one species be considerably abridged.

We are now come to the preliminaries of copulation. We have described them in our work, making use of the observations of Balbiani, Gruber, and of Engelmann, some of which we found confirmed by Bütschli. M. Maupas, who has recently again taken up this question, believes he has discovered in his predecessors, or rather in the observations of M. Balbiani, grave errors. I shall transcribe the passage in question: "When a numerous group of Infusoria of the same species are found in the conditions that determine copulation, these animalcula abandon themselves to certain movements, and exhibit an agitation the significance of which has been much exaggerated. Balbiani, who in fact always seeks analogies with the higher animals, has given us an animated description of these movements, to which a poetical imagination has contributed at least as much as exact and scientific observation. This description has met with a most favorable reception among certain philosophers and psychologists who have taken up with it in the belief that they could thereby reveal in microzoans the rudiments of the instincts and psychic faculties of higher-organized beings. As there is very much inexactitude and exaggeration in all that, it is time to calm this enthusiasm and to refer the facts and their explanation to some more exact criterion." (Page 413.)

I believe it useless to occupy my time in dealing with the aggressive tone that this author has seen fit to assume towards me, and which seems to be habitual with him when he criticises the works of people with whom he does not agree. I shall carefully examine his observations and seek to derive from them some profit, to the improvement and correction of my work upon the Psychic Life of Micro-Organisms, if it is true that I have committed the grave errors of which he speaks. Besides, the question of the preliminaries of copulation is so interesting in itself that I have no fear of turning to it a second time.

It is necessary, here, clearly to distinguish two things: the facts and their explanations. In that which concerns observed facts, the errors that M. Maupas endeavors to point out in the

descriptions of M. Balbiani appear to me to be capable of a reduction to a matter of so little significance—admitting that it comes at all from error—that if I had not been apprised of it, I should have regarded the researches of the first author as a confirmation in most details of those of the second. It is to be observed, in fact, that M. Maupas gives almost the same description that Balbiani does of the movements of *Paramœcium aurelia*. "I have followed animals of that species a number of times," he says, "during the preparations for copulation. They exhibit at that moment a very great agitation. They are seen to go and come, rapidly changing their direction. They approach and throw themselves against their congeners, halt in front of them, feel them an instant with their cilia, then leave them, assume the most varied positions, and, finally, when two individuals equally ready for union chance to meet each other, they face about by their anterior extremities so that the two bodies come together and join, with the exception of the posterior extremities, along their whole extent; the union is thus definitively effected."

Up to this point, let it be observed, our author's description is but a paraphrase of that of M. Balbiani, which we have given on page 69 of our work; and a simple comparison of the two suffices to prove this. The divergences of fact extend, as it seems to me, to the two following points only: The duration of the preliminaries, and the existence of an epidemic of copulation. M. Maupas thinks that the movements in question never last very long, at the most a quarter of or half an hour among individuals that have arrived at karyogamic maturity. Whereas M. Balbiani has observed these same movements last for several days. I do not know which of these two observations is the more exact; in fact, I do not think it necessary to choose between them, since both may be exact, the duration of the phenomenon generally being dependent upon conditions subject to great change, while M. Maupas himself remarks that the ciliate Infusoria in the variability of all their biological phenomena are veritable thermometers of a very great sensibility. However that may be, whether the movements that precede copulation in *Paramœcium* last a quarter of an hour, half an hour, or several

days, that fact does not change their real character. The second divergence relates to the epidemics of copulation in the case of *Paramæcium aurelia;* observed by M. Balbiani and denied by M. Maupas. "All the individuals of a group," says M. Maupas, "are never found simultaneously in this condition. Hence the tentative preliminaries of copulation, that fail in their object and end in the individuals going to seek elsewhere another partner." I confess, I do not understand this statement, involving, as it does, M. Maupas in a contradiction; for two pages before this he speaks of the mode of the appearance of copulation as in the epidemic form. All observers, he says, that have occupied themselves with this phenomenon, state that it is suddenly developed in the little aquariums in which the animals are contained, and very rapidly becomes general (page 41).

To this then the divergences of fact are reduced—a matter entirely insignificant; and I believe it useless to dwell upon it longer. The question of interpretation remains. I shall also say a few words with reference to this, although the disagreement is at bottom not much more serious.

We have seen, that, according to M. Maupas, the Infusoria do not seek each other and copulate until after a fast of considerable duration caused by exhaustion of the store of food in the medium in which they live. The author concludes from this that scarcity of food is the sole and real cause of the great agitation in which they are then seen. "When an infusion thickly populated begins to get exhausted, the animalcula congregate together, always forming those whitish cloud-spots that we have described as the prelude to copulation. . . . Not until afterwards do the actual movements of copulation occur, which never last very long." Accordingly, there is first an agitation produced by hunger, and only in consequence of that are the preliminaries of copulation brought about. Admitting this interpretation as exact, which is indeed a question that I reserve, I conclude that M. Maupas completely accepts the facts of the preliminaries of copulation, distinguishing them from other phenomena that precede them. He says, moreover, and these are his own words, that the sexual impulse does indeed exist in these little creatures. Unquestionably he is right in adding that this sexual impulse pre-

sents in the ciliate Infusoria manifestations much simpler than in the higher animals, and that it is otherwise in accord with their simplicity of organisation. That is evident, and no one I believe has ever maintained the contrary.

Finally, the author refuses to admit that the sexual manifestations of the Infusoria can be compared with the phenomena of *rut*. "Rut," he says, "the external and psychic manifestations of which we know with any degree of exactitude only in mammals, is a reflex phenomenon concomitant with and consecutive to the maturation of the Graafian vesicles. It is therefore an especial phenomenon peculiar to the females of the highest group of the animal series. Males are not subject to rut, but are always ready to experience the sexual excitation whenever they find themselves in contact with females that are fallen into that condition" (page 414).

Naturalists will certainly read with great astonishment this definition of rut, which is wholly new and personal to the author. Hitherto the word rut has not been reserved for mammals; it has been applied to all classes of animals, even to the lowest, and Duvernoy, for example, has devoted an article to the rut of zoöphytes.

We now come, following the chronological order of the phenomena, to the material processes of conjugation, otherwise called fecundation, in the ciliate Infusoria. It is needless to take up in its entirety a question that we have already examined, and which will be found treated of at page 65 of our work. But it is certainly interesting to dwell upon the general significance of the question of fecundation. It is known that all ciliate Infusoria, excepting some species such as *Opalina*, a parasitic infusory of the frog, exhibit in their protoplasm two kinds of nuclear corpuscles. First a nucleus, a principal nucleus, which the authors designate by the names endoplast and macronucleus; this element is in some ways comparable to the nucleus of the cells of tissues. Besides this the ciliate Infusoria possess a smaller nuclear element than the former, called by the authors nucleolus, or endoplastule, or attendant nucleus, or finally micronucleus. This micronucleus comprises in its evolution the internal phenomena of the process of conjugation. The principal nucleus plays in the process but an accessory rôle,

for it is a wasted element destined to be replaced by a nucleus of new formation; when it undergoes more or less complete elimination. The attendant nucleus passes through a series of complicated modifications which vary much in detail for each species. First, there are stages of division destined to prepare the way for the elimination of the used up corpuscles. But the most important fact is that at a given moment there exists in the protoplasm of each ciliate Infusory in conjugation, two corpuscles derived from the nucleus; then an exchange is effected between the two individuals in copulation; each transmits to the other one of the corpuscles, which copulates with the remaining corpuscle left in the interior of the body. These two little nuclei that play parts so different are, according to M. Maupas, completely identical with one another and do not show the least difference either in form, volume, or structure. "In the twelve species in which I have succeeded in closely studying these organs," says that author, "I have always seen them act with the most perfect similitude under the influence of coloring and fixitive re-agents." Nevertheless, in view of the future condition of these two elements, M. Maupas is led to give them the very significant names of male pronucleus and female pronucleus. The female pronucleus is the one that remains immobile in the body of the parent gamete; while the other, the male, is exchanged and passes into the body of the other gamete.

In what does the real nature of the copulation of these two pronuclei consist? Does it consist in a fusion of the elements mentioned, or, indeed, do the latter preserve their original independence and autonomy in the midst of the new mixed nucleus, standing in juxtaposition with and moving in and about one another? This is the question that M. Maupas immediately proceeded to examine. The recent researches of M. Ed. Van Beneden upon the internal mechanism of fecundation in *Ascaris megalocephala* are well known. We have published in the *Revue Philosophique*, following M. Balbiani, a résumé of these important investigations, and we may be permitted to reproduce here a few passages therefrom; for nothing is more interesting than the evolution followed by our ideas in that which concerns fecundation.

The notions that were formed of this phenomenon only took definite and precise shape from the time when the existence of the two elements of fecundation, the spermatozoön and the ovum, could be established. It was at first believed that the spermatozoön impregnated the ovum by the exercise of a purely physical action—an action of contact and influence. But observation demonstrated that something more took place, namely, an actual conjugation, a union, a blending of the spermatozoön and the ovule. A further step was made in 1875, when it was discovered, in studying the ova of Echinoderms, that but one single part of the ovule, the germinative vesicle, conjugated with but one part of the spermatozoön, namely the head, and that since these two elements have each the value of a nucleus, fecundation consisted in the conjugation of two nuclei. But there was still an element of obscurity in this idea, simple as it was. If the nuclei were vesicles like soap-bubbles they might burst, the one within the other; but the nucleus contains a great number of differentiated elements, the chromatic reticulated substance, the nuclear substance, the nucleoli, etc.: what becomes of all these elements during the conjugation of the two nuclei? In 1881, Flemming made a new advance in the question. He determined more precisely the nature of the fusion of the two pronuclei, establishing that it consisted in the blending of their chromatic substances. This he observed in the ova of the Echinoderms. According to the very recent works of M. Van Beneden upon *Ascaris megalocephala*, the great nematoid of the horse, there is no fusion whatever between the two pronuclei. They always remain distinct. Each passes through, separately, all the phases of karyokinesis, when the fecundated ovum divides. In this connection the recent observations of M. Balbiani confirm the opinion of Van Beneden, who had been sharply attacked by Carnoy and Zacharias. First, in each of the two pronuclei each reticulate substance is observed to present the initial phases of karyokinesis; the net-works form into a skein that contracts and thickens; the ribbon-like body thus formed divides into two segments, which bend so as to form acute-angled crooks or loops. There are thus produced two loops in the male pronucleus, and two in the female pronucleus. Then the two

male loops approach the two female loops in a manner such that a sort of star is formed with eight branches turned towards the periphery of the ovum (nuclear or equatorial disk). Then the fecundated ovum begins to divide into segments. Now at every new equatorial stage of the subsequent divisions of the ovum these four loops are seen to reappear in such a manner that fusion never takes place between the male element and the female element. Each of the four primitive chromatic loops divides by longitudinal division into two secondary loops, whence result two equatorial semi-disks, each formed of four secondary loops, of which two come from the male pronucleus and two from the female pronucleus. Each of the two new nuclei contains therefore a certain number of male and female chromatic loops, and consequently presents an hermaphroditic constitution.

For Van Beneden, therefore, fecundation consists essentially in the presence in the ovum of two nuclei, one male and one female. The conjugation of the two nuclei is a phenomenon of no importance; it may take place, or it may not. The physiological signification of fecundation is a process of rejuvenation, in which the ovum replaces its old male element with a new male element, the spermatozoön.*

M. Maupas remarks that the pronuclei of the Infusoria by reason of their complicated structures do not admit of these difficult investigations. Nevertheless he mentions the fact that these pronuclei are, in the elements mentioned, composed of two distinct substances, hyaloplasm and chromatin. He puts forth the opinion that the hyaloplasm constitutes an accessory portion, and that the chromatin is endowed with the fecundative properties. Which means that in certain ciliate Infusoria the male pronucleus at the moment of its migration is composed solely of chromatin. Finally, M. Maupas arrives at the conclusion that the supreme end of fecundationis the renovation, the reconstitution, of a rejuvenated nucleus formed by the copulation of two fecundative nuclei having distinct origins

* *Recherches sur la Maturation de l'Œuf, etc. Arch. de Biol. Vol. iv. 1883. Nouvelles Recherches sur la Fécondation. Bul. de l'Acad. Roy. des Sciences de Belgique, 3 Série, Vol. xiv. 1887.*

and of which the chromatin elements represent the essential part (page 434).

* * *

It is now time to return a moment to the theory of Weismann and to see if it has not been shaken by the new data that we have just placed before the reader. Accepting the results of the experiments of M. Maupas, who, as a matter of fact, has arrived at the same conclusions as M. Balbiani, we are led to the admission that when a ciliate Infusorian multiplies by agamic division a great number of times, the offspring that appear after from 50 to 100 bipartitions has not the same physiological value as its original progenitor; and that agamic multiplication ends in exhaustion and in natural death. But it must, on the other hand, be taken into account that this process of senescence is counteracted by that of conjugation, which consists in a nuclear renovation; and since the substance, the protoplasm, of the rejuvenated individual escapes death, a new argument might be found in these last mentioned facts for the theory of the immortality of Infusoria.

The question is, at bottom, whether the individual after conjugation is identically the same as before conjugation, or whether it constitutes a new animal. In that the solution rests. Now, the new element that the individual acquires by the act of conjugation is the male pronucleus of its partner. In addition it loses the greater part of its old accessory nucleus and the whole of its old principal nucleus. In return, by way of compensation, it preserves the integrity of its protoplasm and of its other organs. M. Gruber believes that physical identity persists in spite of these modifications. M. Maupas maintains the contrary.

It seems to us that a question of this character does not admit of a satisfactory solution, and this opinion will be shared by all who have considered the idea of physical identity. It is a notion obscure, uncertain, and full of contradictions. We have formed it because it answers our practical needs. But it is certainly evident that it corresponds to no well defined external phenomenon. In fact, we understand by physical identity the constant reunion of certain elements in a certain order. If the order of these elements is very

slightly modified, or if a very small number of these elements is replaced by others, we do not hesitate to say that the physical identity in question has not been altered by these insignificant modifications. If, on the other hand, the order has been almost totally destroyed, if the greater portion of the elements has been renewed, we should, on the contrary, say that the identity of the thing in question had been lost in these alterations and that a new object had replaced the old. Replace a stone in a house and the latter remains the same house; rebuild the house upon a new plan and with different materials retaining very little of the first construction, and it is a different house. But between these two extreme cases there is a whole series of possible intermediate changes, and we are not able to establish clearly by any exterior mark the point where physical identity ends. This is a matter of personal estimation; I might even say of caprice; and all the discussions raised upon these questions appear to me wholly idle.

I believe, accordingly, that the thesis of Weismann regarding the immortality of Infusoria eludes a direct refutation. It is neither confirmed nor overturned by observed facts.

ALFRED BINET.

ON THE MATERIAL RELATIONS OF SEX IN HUMAN SOCIETY.

MUCH interest is displayed at present in the development of woman, both as to her personal characteristics, and in her relations to her surroundings in human society. It is justly said that the civilisation of a nation may be measured by the degree of humanity displayed by its men towards its women. This is for the reason that, since women are the weaker sex, man has only ethical reasons for self-restraint in his treatment of her. Nowhere is the sex-interest under better ethical control than in the United States; and it is in this country also that we hear the most of reforms which are necessary in order that woman may attain a further development, and assume a higher position in relation to the state. This being the case, it is extremely important that the foundation facts, or in other words the necessary natural conditions, under which the sexes co-operate in society, should be fully understood. That they are not understood, or that they are intentionally ignored in some quarters, is evident to any one who reads the current literature of the subject.

The relation of the male man to his environment involves the usual struggle for existence more or less active. His *pièce de resistance* is the mineral and vegetable world and its atmosphere, and his antagonist is his fellow man. The former generally yields more or less abundantly to his solicitations. What he gets from his fellow man is acquired through the necessities of the latter, and the benefit may be mutual, or it may be all on one side. His best friend may unconsciously and unintentionally, in the regular order

of trade, reduce him to beggary, or compel him, as an alternative, to emigrate to a distant land. Such results are more frequent as population increases. To maintain himself against the destructive forces of nature, such as cold, heat, rains, tempests, fires, blights, etc., is his necessary occupation. If he pursue a profession, or if he be in trade, he must supply the actual needs of his fellow man, and beware that competition and monopoly do not deprive him of all return for his labor.

Woman, considered by herself, is subject to identical conditions. Her needs are the same and her environment is the same. But she is not so well endowed as man to supply the one or to meet the other. Her disabilities are of two kinds, physical and mental. The physical are: first, inferior muscular strength, and secondly, childbearing. The latter means more or less incompetence for active work at monthly periods, or several months of gestation and lactation, and some years of care of children. The mental disabilities are: first, inferior power of mental co-ordination; and secondly, greater emotional sensibility, which interferes more or less with rational action.*

From these facts it is evident that, were woman of the same sex as man, that is, were she simply another kind of man, she would soon be eliminated from the earth under the operation of the ordinary law of the survival of the fittest. This need not be through any agencies different from those now actually in operation among men under the circumstances of peaceful trade. And such is often the actual history of male men who possess marked feminine characteristics. It does not follow from this, that some women might not sustain themselves apart from men, in agriculture, trade, and the professions. This is especially possible where the struggle is not very severe; but in the cases which exist, few are really independent of male assistance, which has furnished the capital, either of cleared land, money, or as an appointing power. The general result, as above stated, is self-evident from the facts.

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* This is, of course, only true where the sexes of the same subspecies or race are compared.

Remedies for this disability are frequently proposed. A higher education, while an unquestioned advantage, does not remove it. The ballot would only result in removing any disability of an artificial character which might exist, but could not effect those imposed by nature. There is no method of human contrivance by which the natural difficulty may be overcome.

But Nature has supplied a most effective remedy. Woman not being of the same sex as man, supplies a necessity which is almost universal, so that she is placed, if she exercise reasonable care, in a position better than that of man in relation to the struggle for existence. The antagonist of man, his fellow man, is eliminated from the list of the antagonists of woman, and that is an advantage which cannot be overestimated. Not only is man removed from the field as a competitor, but he becomes an active helper in resisting the forces of nature. More than this, he is willing under the circumstances, to divide with her what he extracts from both man and nature. Were these the only benefits that woman derives from man they would constitute a sufficient reason for the usual preference which she displays for his protection, rather than for a life of independence. But she is herself possessed of a sex-interest which is satisfied by such a relation. Not only this, but her love of children constitutes a further inducement, which is highly effective in bringing about her customary relation with man.

It is self-evident then that any system which looks to a career for women independent of man, such as man pursues, is abnormal, and injurious to her interests.

The support and protection given by man to woman is then clearly rendered as an equivalent for the services she renders him in the capacity of a wife. It is universally implied, if not distinctly stated in the contract between them, that she shall not be the wife of some other man, and that the children she bears shall be also those of the male party to the contract, or the husband. It is not necessary that any such obligation should be entered into by the man, for the obvious reason that he does not bear children. If the woman violates this contract, the man is under no moral or legal obligation to support her. If the man has other wives he does not

thereby forfeit protection and support of the wife, since she has none to offer him. This general fact would not prevent a woman possessed of wealth who supported a husband, from withdrawing such support in case he should become polygamous. But such a situation is so exceptional as to deserve but a passing notice in a consideration of the whole question.

It is frequently insisted that responsibility of man to woman in the matter of monogamic relations, is ethically the same as that of woman to man. This has not been the view of mankind generally, and it is distinctly negatived by the facts in the case. The marriage relation is clearly a contract in which the consideration on one side is support and protection, and the consideration on the other is monogamic wifehood, or the definite paternity of children and their care and education. The immediate reason why particular men and women marry particular women and men, is, or ought to be, love and affection; but these admirable sentiments, are the offspring of natural conditions of sex, without which woman, and especially man, would not marry at all. And these natural conditions are clearly satisfied by the maintainance of the contract as above described. In order to further enforce this position I merely refer to the well-known fact that man cannot commit marital infidelity in the same sense that woman can, on account of his physical diversity. His unfaithfulness introduces no new blood into a family, and makes no defect in the inheritance, as does the same act on the part of the woman. The woman is in a position of trust, precisely like the responsible officers of a bank. It is in the power of both to defraud those who trust them. Hence it is that woman has been always held to stricter account in this matter than man, and always must be. For this reason the jealousy displayed by husbands is more justifiable than that displayed by wives; and the result of marital infidelity on the part of wives is usually more disastrous to the offending parties. It is in consequence of these facts that there exists some difference in the ethical feelings of the sexes on this question. It is undoubtedly true that there are more women willing to live in polygamy than men willing to live in polyandry, in spite of the verbal objections that women make to such a system in modern times.

I do not now refer to promiscuity, in which the affections are in no wise concerned. In this everyway inferior relation, men are the most numerous offenders. It is for the reasons above stated that women are more monogamous in their tendencies than men. Not only does the question of support and protection during child-bearing and at other times make it more to their interest to be so, but they are more inclined to attach themselves to particular persons than men, on account of their superior affectional endowments. This is an inevitable result of their occupation in the family and with the family for countless ages, and is as much a product of their evolution, as is the superior rationality and self-control of the male sex.

The above picture may seem to some persons of progressive views on "the woman question" somewhat onesided. But the relation of man to the contract is not yet completely described. Meanwhile I refer to a sentiment attributed to a single woman, a teacher in a girls' school, I believe near Pittsburg, quoted by a lady writer in the *Popular Science Monthly*, several months ago. This lady, believing that the strength of the emotional elements of character in women constitutes a disability, and stands in the way of her so-called equality with man, had resolved to suppress that part of her nature, and to live a life free from its consequences. She hoped thus to attain a condition not only equal, but superior to that of men, and was prepared to teach the girls committed to her care that this was their duty to themselves and to the world. For this reason she would not marry. The fallacy in this reasoning consists in the omission of certain important premises. The principal one of these is, that neither she nor any other woman can exterminate in a life-time, the heritage which woman has derived from the entire history of the human species, to say nothing of the inheritance from the ancestors of mankind, where the same traits exist in the diminished ratio of a smaller mentality. In order to accomplish this change in female character, it would be necessary that the same course should be pursued by many successive generations of women; how many, it is impossible to calculate. This would require that such women should marry, which is what the lady whose views are referred to above, desired to avoid. In fact it is typical women

who will marry, and typical women will be therefore produced to the end of time, unless some new system of sex relations shall be introduced.

It is sometimes suggested that a change in intersex relations is desirable in order to effect a fuller emancipation of women from present conditions. With the remark in passing, that the natural restraints imposed by the present marriage system on woman are not greater than those imposed on man, although different, we may refer to the alternative arrangement which has been sometimes adopted. This is that woman should be free from all obligation to fidelity to any particular man, and that man should be free from the obligation to support any particular woman. In other words it is sometimes proposed that we return to the primitive state of human society. Such a system has descended to us from ancient times, and it only needs to be mentioned to satisfy us that woman is the loser by it to a degree that is disastrous to the interests of society in every respect. It is only a being devoid of the developed traits of womanhood who could succeed in a polyandrous career, since she must renounce the pleasures of family life, even if she is exceptionally able to accumulate the means of support for her self and children in later years.

A second alternative, that woman may secure the support of one man, while her marital relations are polyandrous, is an impossible dream of the imagination. This could be only possible under the condition that the child-bearing sex should be the stronger sex, and fully capable of self-support and self-protection; a condition which is not found in mankind.

A third alternative is the communistic relation where the state supports women and children, without inquiry as to parentage, and without reference to the monogamic or promiscuous relation of the sexes. Such a system, could it continue long enough, would result in the breaking up of the sentiment of conjugal affection which now characterises our race, and the destruction of marital fidelity. The question is whether or not this system would be preferable to that of monogamic marriage above described. As it is a proposition for the amelioration of the present condition of women, the decision

should rest with them. The women of the white race would probably declare against it by a very large majority, were a vote to be taken. This vote would be, however, largely influenced by custom, and not by a deliberate conclusion derived from experience. Since experience of such system cannot be had at present, we are compelled to rely on such knowledge as we possess in the premises.

It may be safely assumed that the monogamic tendency is constitutional with the majority of women. In spite of curiosity and other inducements, the idea of love for a single person is deeply ingrained in her nature. It is an ideal to be realised somehow and at some time, and anything short of it is a disaster only to be endured through some irresistible necessity. No normal woman would hazard the risks to person and property involved in indefinite matrimonial relations. The idea of the family becomes the more fixed in proportion as it is realised in actual experience. In spite of pessimists and unfortunates, the mutual love of man and woman is a sentiment deeply seated in the nature of both. Its strength is attested by the enormous popularity of the literature of which it forms the theme, and of the drama where its history and vicissitudes are depicted. Men and women who underrate its power, or who attempt to resist its effects, are like dead leaves before the winds. Would men and women be satisfied with a system which should place these affections in constant suspense, and which should afford no safeguard for the protection of inexperience, or defense against the temporary effects of superficial attractions and repulsions? I suspect not, for more would be lost than gained by such possibilities. Relief from unfortunate connections is certainly proper, but this can be had in such a way as to render it certain that the best interests of both parties are subserved, by a system of time contracts of marriage, such as I crudely suggested in *The Open Court* for November 1888. But the emotions of sex cannot be safely left without safeguards derived from the experience of mankind. This is not only on account of the force of these passions themselves, but because of the material necessities which are so intimately involved with them. The element of paternal interest will have to be eliminated from the man, and of conjugal fidelity from the woman be-

fore a communal system can be possible. And the absence of these traits is only characteristic of some of the lower races of men at the present time. Evolution has not weakened, but has greatly strengthened them, and it is not likely that our race will go backward in this respect.

Of course it may be asserted that this evolution has taken the wrong direction, and is not an improvement. I think the contrary may be shown to be true. The paternal instinct is as important to the adolescent stages of man as the maternal is for the period of infancy. Paternity stimulates the man to labor for the support and education of his children, and for their general well-being. Without such support many would die, reach an imperfect development, or become feeble members of society. The fidelity of the woman develops the same trait in man, and it stimulates him to the greatest exertions to secure her well-being also. Such forces as these cannot be withdrawn from society without infinite loss. It is the knowledge that this is *my* wife and that these are *my* children, that sustains more than half of human industry. With a communistic system these inducements would be withdrawn, and mankind would sink into comparative apathy, were it possible for the system to endure long enough.

It is evident that monogamic and polygamic systems are the only ones possible to modern society. The polygamic requires little notice because the general equality in numbers of the sexes deprives it of foundation. It is only possible where women are in excess, and where they are willing to sustain it. No man who is successfully married is likely to incur the additional obligations which it imposes. It may be therefore dismissed from notice with the further remark that it is not on the other hand deserving of the obloquy cast upon it by certain persons who are evidently "compounding for sins they have a mind to by damning those they're not inclined to."

The monogamic relation having been defined in the preceding paragraphs I recur to some of its obligations. I have spoken of the infidelity of woman as of a higher degree of criminality than that of man, and have shown the basis of justice on which this general sen-

timent rests. But it must not be forgotten that while he who hires a murderer, and he who receives stolen goods does not commit the actual crime, he is highly culpable, and shares in the condemnation which should follow it. In the case of the marital infidelity of the woman, he may be the greater criminal of the two, as the instigator to a deed which would not have been otherwise even suggested. In any case his folly is extraordinary, as he takes his life in his hands, and risks that of his partner; for men are wont to preserve their family rights by summary process. It would be incredible that such risks should be taken were it not that history and contemporary literature offer many examples. The few cases where palliating circumstances could be claimed would chiefly occur in countries where divorce laws do not exist.

The advantages to woman, arising from the monogamic relation, are then, support and protection, and undivided affection if she deserve it, together with the satisfaction of the conjugal and maternal instincts. In order to secure these advantages she must pursue a course towards her husband in some degree comparable to that by which her husband secures the confidence and esteem of his fellow man. Faithfulness in adhering to contracts, and personal complaisance cover much of the ground. As regards the man, he must see to it, that he does nothing that tends to the disintegration of the family relations of other men. The ill disguised laudation of the infidelity of wives which is so prominent in French literature, is a mark of a low civilisation, and it rightly excites the disgust of all men who have any respect for their own rights. It looks as though certain French literature had been written by boys. Men who are responsible for such invasion of the rights of others, cannot expect better treatment themselves, and they must not be surprised if they are repaid in their own coin. While the preservation of the rights of the marriage contract lies primarily with woman, for natural reasons; man is held by his fellow man to a strict accountability, and he attempts any invasion of them at his personal peril.

The principles above laid down are those out of which have grown our laws on the subject. Some women and men appear to think them unjust to women. It is true that in some respects,

woman is at a disadvantage. This disadvantage is, however, of natural origin and cannot be overcome. On the other hand, she has a full equivalent in the advantages which she also derives from the natural order of things. The result is that there is no real cause of complaint, unless it be that sometimes the gallantry of men towards women whom they do not know, leads them to do injustice to man in cases of dispute. And here is an advantage to women which is an offset to the injustice which they sometimes experience from the same source. The correction of these faults is a part of the process of ethical development which is going on in human society. And perhaps the most effective agency in this development is the relation of the members of the family to each other, where affection takes the place of force, since it is the source of our deepest pleasures and our severest pains.

E. D. Cope.

THE ANALYSIS OF THE SENSATIONS.

ANTIMETAPHYSICAL.

I.

THE great results that physical research in the last centuries has achieved, not only in its own domain, but also, by the assistance it has afforded, in the domain of other sciences, have brought it about that physical ways of thinking and physical methods of procedure have everywhere attained to especial prominence, and that the greatest expectations are associated with their employment. In conformity with this drift of modern research the physiology of the senses, gradually leaving the paths that had been entered upon by men like Goethe, Schopenhauer, and others, but especially with the greatest success by Johannes Müller, has also almost exclusively assumed a physical character. This tendency must appear to us as not exactly the proper and the desirable one, when we reflect that physics despite its considerable development nevertheless constitutes but a *portion* of a greater collective body of knowledge, and that it is incompetent with its limited intellectual methods, created for especial and limited purposes, to exhaust the entire material of the province now under consideration. However, without renouncing the support of the science of physics, it is possible for the physiology of the senses not only to continue its own special development, but also to afford physical science itself valuable assistance. The following simple considerations will serve to illustrate this relation.

II.

Colors, sounds, temperatures, pressures, spaces, times, and the like, are united with one another in the most manifold ways; and to these are joined moods of mind, feelings, and wills. Out of this complication, that which is relatively the more fixed and the more permanent stands prominently forth, engraves itself in the memory, and expresses itself in language. As relatively more permanent appear, first, *complexes* of colors, sounds, pressures, and so forth, that are connected in time and space, that therefore receive special names, and are designated as *bodies*. Such complexes are by no means absolutely permanent.

My table is now brightly and now darkly lighted. It may be warmer or colder. It may receive an ink stain. One of its legs may get broken. It can be repaired, polished, and replaced part for part. But for me, amid all, it remains the table at which I daily write.

My friend can put on a different coat. His countenance can assume a serious or joyful expression. The complexion of his face, under the effects of light or of emotion, can change. His shape can be altered by a movement, or can be permanently transformed. But the sum total of the permanent, as compared with gradual alterations of this kind, always remains so great, that the latter vanish. It is the same friend with whom I take my daily walk.

My coat can receive a stain, a tear. The very manner of my expression indicates that the gist of the thing is a quantity of permanency, to which the new element is added and from which that which is lacking is subsequently deducted.

Our greater intimacy with this quantity of permanency, and its preponderance as contrasted with the changeable, impel us to the partly instinctive, partly voluntary and conscious economy of mental representation and designation which is expressed in ordinary thought and speech. That which has been *once* perceptually represented receives *a single* designation, *a single* name.

As relatively permanent, is exhibited, further, that complex of memories, moods, and feelings, joined to a particular body (the

human body), which is denominated the "I" or "Ego." I can be engaged with this subject or with that subject, I can be quiet or animated, excited or ill-humoured. Yet—pathological cases not considered—enough that is permanent remains to recognise the ego as the same. Moreover, the ego also is only of relative permanency.

* * *

The apparent permanency of the ego consists pre-eminently in the fact of its *continuity*, and in its slow change. The many thoughts and plans of yesterday that are continued to-day, and of which our environment in waking hours continually reminds us (and therefore in dreams the ego can be very indistinct, doubled, or entirely wanting), and the little habits that are unconsciously and involuntarily kept up for longer periods of time, constitute the fundamental root of the ego. There can hardly be greater differences in the ego of different people, than occur in the course of years in *one* person. When I recall to-day my early youth, I should take the boy that I then was, with the exception of a few single features, for a different person, did not the chain of memories that make up my personality now lie before me. Many a treatise that I myself wrote twenty years ago, now makes upon me a very strange impression. The very gradual character of the changes of the body also contributes to the permanency of the ego, but in a much less degree than people imagine. Such things are much less analysed and noticed than the intellectual and the moral ego. Individually, personally, people have a very poor knowledge of themselves.

Once, when a young man, I espied in the street a face in profile that was very displeasing and repulsive to me. I was not a little taken aback when a moment afterwards I found that it was my own, which, in passing by a place where mirrors were sold, I had perceived reflected from two mirrors that stood at the proper inclination to each other.

Not long ago, after a trying railway journey by night, being much fatigued, I got into an omnibus just as another gentleman appeared at the other end. "What degenerated pedagogue is that, who has just entered," thought I. It was myself: opposite me

hung a large mirror. My ordinary dress, accordingly, was more familiar to me than my travelling attire.

The ego is as little absolutely permanent as bodies. That which we so greatly fear in death, the annihilation of our permanency, actually occurs in life in abundant measure. That which is most valued by us, remains preserved in countless copies, or, in cases of exceptional excellence, as a rule preserves itself. In the best human being, however, there are individual traits the loss of which neither he himself nor others need regret. Indeed, at times, death, viewed as liberation from individuality, can even become a pleasant thought.

* * *

After the first survey has been obtained, by the formation of the concepts of substance, "body" "ego" (matter, soul), the will is impelled to a more exact examination of the *changes* that take place in this relatively permanent existence. The changeable element in bodies and in the ego, indeed, is the very thing that moves the will. Now, for the first time, do the constituent elements of the complex stand forth as properties of the same. A fruit is sweet; but it can also be bitter. So, too, other fruits can be sweet. The red color that is sought is found in many bodies. The neighborhood of some bodies is pleasant, that of others unpleasant. Thus, gradually, do different complexes appear to be composed of common constituent elements. The visible, the audible, the tangible, are separated from bodies. The visible is broken up into color and into form. Out of the manifold constitution of colors issue, again, in lesser numbers, certain other constituent elements—the primary colors, and so forth. The complexes are disintegrated into *elements*.

III.

The proper and useful habit of designating that which is permanent by a *single* name, and of comprehending the same in a *single* thought, without analysing at each operation its constituent parts, is liable to come into singular conflict with the tendency to separate these constituent parts. The obscure image formed of the permanent, which does not perceptibly change when one or another constituent part is taken away, appears to be something existent *by itself*.

Inasmuch as it is possible to take away *singly* every constituent part without effecting the capacity of the image formed to *represent* the totality involved, or effecting its subsequent recognition, it is imagined that it is possible to take away *all* these parts and yet have something remaining. Thus arises the monstrous idea of a *thing of itself*, different from, and incognisable with relation to, its "phenomenal" existence.

Thing, body, matter, are nothing apart from this complex of colors, sounds, and so forth—apart from their so-called marks, or characteristics. That Protean, illusory philosophical problem of a *single* independent thing with *many* properties, arises from the misunderstanding of the fact, that extensive comprehension and accurate separation, although both are temporarily justifiable and profitable for a number of purposes, can not and must not be employed *simultaneously*. A body is *single* and unchangeable so long as it is not required to take details into consideration. Thus both the earth and a billiard ball are *spheres* so long as we disregard all minor deviations from the spherical form, and greater exactitude is not necessary. But if we are compelled to carry on investigations in orography or microscopy both bodies cease to be spheres.

IV.

Man possesses in pre-eminence the power to determine arbitrarily and consciously his point of view. He can at one time disregard the most salient features, and immediately afterwards take into account the smallest trifles; now regard a current of electricity as fixed, without consideration of its contents, and now determine the width of a Frauenhofer line in the solar spectrum; he can rise, at will, to the most general abstractions, or bury himself in the minutest particulars. The animal possesses this capacity in a much less degree. It does not assume a point of view, but usually is brought to it by impressions. The baby that does not recognise its father with his hat on, the dog that is perplexed at the new coat of its master, have succumbed in the conflict of points of view. Who has not been thus worsted in similar cases? Even the man of phi-

losophy at times succumbs, as the fantastic problem above referred to, shows.

Indeed, do not certain circumstances actually appear to furnish a justification of that problem? Colors, sounds, the odors of bodies are evanescent. But the tangible part, as a sort of constant, durable nucleus, not easily liable to annihilation, remains behind; appearing as the vehicle of the more fugitive properties annexed to it. Habit firmly affixes our thought to this central nucleus, even where the knowledge has found its way, that seeing, hearing, smelling, and *touching* are intimately akin in character. Added to this, also, comes the fact, that in consequence of the singularly extensive development of mechanical physics a kind of *higher reality* is ascribed to Space and Time than to colors, sounds, and odors. Agreeably to which, the junction in space and time of colors, sounds, and odors appears *more real* than colors, sounds, and odors themselves. The physiology of the senses, however, demonstrates, that spaces and times can with as much justice be termed sensations, as colors and sounds.

v.

Also the ego, as well as the relation of bodies to the ego, occasions the rise of analogous seeming-problems, the character of which may be briefly presented in the following manner.

The complexes of colors, sounds, and so forth, that are commonly called bodies, we shall designate for the sake of simplicity by $A\ B\ C\ldots$; the complex that is known as our own body, and which constitutes a part of the former, we shall call $K\ L\ M\ldots$; the complex composed of volitions, memory-images, and the like, we shall represent by $\alpha\ \beta\ \gamma$. Usually, now, the complex $\alpha\ \beta\ \gamma\ldots K\ L\ M\ldots$ is opposed as ego, to the complex $A\ B\ C\ldots$ regarded as world of substance; sometimes, too, $\alpha\ \beta\ \gamma\ldots$ is comprehended as ego, and $K\ L\ M\ldots A\ B\ C\ldots$ comprehended as world of substance. Now $A\ B\ C\ldots$ first appears as independent of the ego. But this independence is only relative, and gives way before closer inspection. Much, it is true, may change in the complex $\alpha\ \beta\ \gamma\ldots$ without much becoming noticeable in $A\ B\ C\ldots$; and so *vice versa*. But many changes in $\alpha\ \beta\ \gamma\ldots$ pass, by way of changes in $K\ L\ M\ldots$,

over to *A B C . . .*; and *vice versa.* (As, for example, when vivid ideas break forth into acts, or our environment brings about perceptible changes in our body.) At the same time *K L M . . .* appears to be more closely connected with $\alpha\ \beta\ \gamma$ . . . and *A B C . . .* respectively, than the latter do with one another; relations that find their commonest expression in thought and speech.

Closely examined, however, it appears that *A B C . . .* is *always* determined with and by *K L M.* A die, when seen close at hand, looks large; when seen at a distance, small; it looks different with the right eye from what it does with the left; sometimes it appears double; with closed eyes it is invisible. The properties of the same body, therefore, appear as modified by our own body; they appear as conditioned by it. But where, pray, is this *same* body that phenomenally appears so *different?* All that can be said is, that different *A B C . . .* are annexed to different *K L M.**

We see an object with a point *S.* If we touch *S,* that is bring it into relation with our body, we receive a prick. We can see *S,* without feeling the prick. But as soon as we feel the prick we find *S.* The visible point therefore is a *permanent fact* or *nucleus,* to which the prick is annexed, according to circumstances, as something accidental. From the frequency of occurrences analogous to this we ultimately accustom ourselves to regard *all* properties of bodies as "effects" proceeding from permanent persistent nuclei and conveyed to the ego through the mediation of the body; which effects we call *sensations.* By this very operation, however,

* I expressed this thought many years ago (in the *Vierteljahrsschrift für Psychiatrie,* Leipsic and Neuwied, 1868: *Ueber die Abhängigkeit der Netzhautstellen von einander)* as follows: The expressions "sense-deception" and "illusion of the senses" prove, that we are not yet fully conscious, or at least that we have not yet found it necessary to incorporate this consciousness into our ordinary terminology, *that the senses represent things neither wrongly nor correctly.* All that can be truly said of the sensory organs is, that, *under different circumstances they produce different sensations and perceptions.* Since these "circumstances" are of so extremely manifold a character, being partly external (inherent in the objects), partly internal (inherent in the sensory organs), and partly interior (having the seat of their activity in the central organs), it would naturally seem, especially when attention is paid only to external circumstances, that an organ acts differently under like conditions. And it is customary to call the unusual effects, deceptions or illusions.

these imagined nuclei lose their entire sensory content, and become mere mental symbols. The assertion is correct then that the world consists only of our sensations. In which case we have knowledge *only* of sensations, and the assumption of the nuclei mentioned, as well as of a reciprocal action between the same, from which sensations might be supposed originally to proceed, turns out to be wholly idle and superfluous. Such a view can only suit a halting realism or a half-matured philosophic criticism.

VI.

Ordinarily the complex $\alpha\ \beta\ \gamma\ \ldots\ K\ L\ M\ \ldots$ is opposed as ego to the complex $A\ B\ C$. Those elements only of $A\ B\ C\ \ldots$ that more actively alter $\alpha\ \beta\ \gamma\ \ldots$, as a prick, a pain, are we accustomed to comprehend in the ego. Afterwards, however, through observations of the kind above mentioned, it appears that the right to annex $A\ B\ C\ \ldots$ to the ego at no point ceases. In conformity to which the ego can be so extended as ultimately to comprehend the entire world.

* * *

When I say that the table, the tree, and so forth, are sensations of mine, there is contained in this, as contrasted with the method of representation of the ordinary man, an actual extension of my ego. And so, too, upon the emotional side, such extensions actually occur; as for the virtuoso, who possesses as perfect a mastery of his instrument as he does of his own body; for the skilful orator in whom the eyes of an audience converge, and who controls the thoughts of his hearers; for the energetic politician who directs with ease his party; and so on. In conditions of depression, on the other hand, such as nervous people often have to endure, the ego contracts and shrinks. A wall seems to separate it from the world.

* * *

The ego is not sharply defined, its limits are very indefinite, and arbitrarily displaceable. Only by mistaking this, and by unconsciously narrowing these limits, as well also as by enlarging

them, do metaphysical difficulties, in the conflict of points of view, arise.

As soon as we have recognised that the supposed unities "body" and "ego" are only make-shifts for a *provisional* survey and for certain practical ends (that we may apprehend bodies, protect *ourselves* from pain, and so forth), we are obliged, in many thorough-going scientific investigations, to abandon them as insufficient and inappropriate. The opposition between ego and world, sensation (or phenomenon) and thing, then vanishes, and we are brought to deal simply with the *connection and relation of the elements* $\alpha\ \beta\ \gamma \ldots A\ B\ C \ldots K\ L\ M \ldots$, for which indeed this very opposition was only a partially appropriate, imperfect expression. This connection is nothing more than the combination of those elements with other homologous elements (time and space). This connection science has simply to *accept*, and set itself aright with regard to it, without attempting to explain its existence.

Upon superficial examination the complex $\alpha\ \beta\ \gamma \ldots$ appears to consist of much more *evanescent* elements than $A\ B\ C \ldots$ and $K\ L\ M \ldots$, in which two last the elements appear to be joined with *more stability* and *in a more permanent manner* (being joined to solid nuclei as it were). Although upon closer inspection the elements of all complexes appear as *homologous*, yet even in spite of the recognition of this fact, the ancient notion of an opposition of body and spirit easily creeps in. The spiritualist feels, at times, the difficulty of imparting the necessary solidity to his world of substance created by mind: the materialist is at a loss what to do when called upon to animate and endow with sensation the world of matter. The *monistic* point of view that reflection and reason have evolved, is easily overcast by the older and more powerful instinctive notions.

VII.

The difficulty described is especially felt in the following considerations. In the complex $A\ B\ C \ldots$, which we have designated as the material world, we find as part, not only our own body $K\ L\ M \ldots$, but also the bodies of other persons (or animals) $K'\ L'\ M'$

. . ., K'' L'' M'' . . ., annexed to which, after the analogy of the complex α β γ . . ., we conceive similar α' β' γ' . . ., α'' β'' γ''. As long as we deal with K' L' M' . . ., we find ourselves in a thoroughly familiar province, at every point sensorially accessible to us. But when we inquire after the sensations or feelings that belong to the body K' L' M' . . ., we no longer find in the province of sense the elements we seek: but we add them in thought. Not only is the domain into which we now enter much less familiar to us, but also the transition to it is relatively unsafe. We are possessed of a feeling as if we were about to plunge into an abyss. They that always pursue this direction of thought and this direction *only*, will never get completely rid of the feeling of insecurity that is very productive as a source of apparent problems.

But we are not limited to this way of reasoning. Let us consider first the reciprocal relation of the elements of the complex A B C . . ., without regarding K L M . . . (our body). Every physical investigation is of this kind. A white bullet falls upon a bell; a sound is heard. The bullet turns yellow before a sodium lamp, red before a lithium lamp. Here the elements (A B C . . .) appear to be connected only *among each other* and to be independent of our body (K L M . . .). But if we take santonine the bullet turns yellow again. If we turn one eye sidewise we see two bullets. If we close our eyes entirely we see no bullet at all. If we sever our auditory nerve no sound is heard. The elements A B C . . ., therefore, are not only connected among each other, but also with K L M. To this extent and to this extent *only* do we call A B C . . . *sensations*, and regard A B C . . . as belonging to the ego. In this way, accordingly, we do not meet with the gap between bodies and sensations before described, between that which is without and that which is within, between the material and the spiritual world.* All elements A B C . . . K L M . . . constitute but *one single* coherent mass, which when any one element in it is disturbed *all* is put in motion; except that a disturbance has a more

* Compare my *Grundlinien der Lehre von den Bewegungsempfindungen.* Leipsic. Engelmann, 1875, p. 54.

extensive and profound action in *K L M* . . ., than in *A B C*. A magnet in our neighborhood disturbs the particles of iron near it; a falling boulder shakes the earth; but the severing of a nerve sets in motion the *entire* system of elements. Quite involuntarily does this relation of things suggest the picture of a viscous mass, at certain places (as in the ego) more firmly coherent than at others.

* * *

When I first came to Vienna from the country, as a boy four or five years of age, and was taken by my father upon the walls of the city's fortifications, I was very much surprised to see people below in the moat and could not understand how, regarded from my point of view, they could have gotten down there; for the thought of another possible way never occurred to me. I remarked the same amazement, once afterwards in life, in the case of a three-year old boy of mine, while taking a walk with him upon the walls about Prague. I recall this feeling to mind every time I engage myself with the reflection above referred to, and I frankly confess that this accidental experience of mine greatly helped to strengthen the opinion upon this point that I adopted a long time ago. The habit of pursuing the same ways in material and psychical things operates to confuse greatly our field of survey. A child forcing its way through a wall in a house in which it has long dwelt, can experience an actual enlargement of its view of the world, and a slight scientific hint can bring much enlightenment.

VIII.

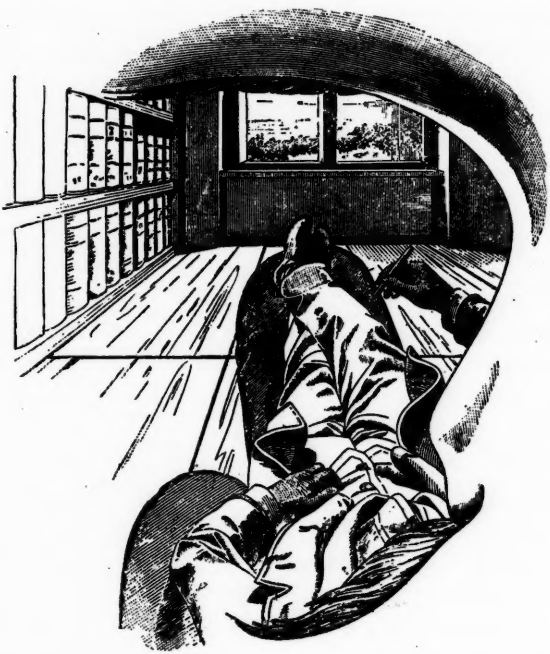
Accordingly, the great chasm between physical and psychological research exists only for the common stereotyped method of observation. A color is a physical object when, for example, we regard its dependence upon its luminous source (upon other colors, upon heat, upon space, and so forth). Regarding however its dependence upon the retina (the elements *K L M* . . .), it becomes a psychological object, a sensation. Not the subject-matter, but the direction of our investigation is different in the two domains.

When, from the observation of the bodies of other men or animals, we infer their sensations, as well also as when we investigate

the influence of our own body upon our own sensations, we are forced to complete observed facts by analogy. This work of completion by analogy is done with much more accuracy and facility, when it relates, let us say, to nervous processes, which cannot be fully observed in our own bodies—that is when it occurs in the more familiar physical domain—than when the completion relates to psychical processes. Otherwise there is no material difference.

IX.

The thoughts presented gain greatly in fixity and vividness if in addition to simply expressing them in abstract form we bring ourselves face to face with the facts from which they arise. For



example, I lie upon my sofa. If I close my right eye the picture represented in the accompanying cut is presented to my left eye. In a frame formed by the ridge of my eyebrow, by my nose, and by

my moustache, appears a part of my body, so far as it is visible, and also the things and space about it. *My* body differs from other human bodies—leaving out of account the fact that every vivid motory idea immediately passes into movement and that contact with it determines more perceptible changes than contact with other bodies—by the circumstance, that it is only partly seen, and, especially, is seen without a head. If I observe an element *A* within my field of vision, and investigate its connection with another element *B* within the same field, I go out of the domain of physics into that of physiology or psychology, if *B*, to use the apposite expression that a friend* of mine employed upon seeing this drawing, passes through my skin. Reflections like that for the field of vision may be made with regard to the province of touch and the perceptual domains of the other senses.

x.

Reference has already been made to the different character of the groups of elements that we have designated by *A B C* . . . and $\alpha\ \beta\ \gamma$. As a matter of reality, when we *see* a green tree before us, or *remember* a green tree, that is *conceive* a green tree to ourselves, we know right well how to distinguish these two cases. The imaged tree has a much less determinate, a much more changeable form; its green is much paler and more evanescent; and, what is of especial note, it distinctly appears in a *different* sphere. A movement that we *propose* to execute is always only a *conceived* movement, and appears in a different field or sphere from that of the executed movement, which moreover always takes place where the image becomes vivid enough. The statement that the elements *A* or α appear in a different sphere, means, if we go to the bottom of it, nothing more than that they are united with divers other elements. To this extent, accordingly, the *basal component parts* in *A B C* . . ., $\alpha\ \beta\ \gamma$ . . . would be *the same* (colors, sounds, spaces, times, motory sensations, innervations . . . .), and only the character of their union different.

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* J. Popper of Vienna.

Pain and pleasure are ordinarily regarded as different from sensory sensations. Yet not only tactile sensations, but also all other kinds of sensations, can gradually pass into pleasure and pain. Pleasure and pain can also justly be called sensations. Only they are not so well analysed and so familiar as sensory sensations. Sensations of pleasure and pain, however faint the mode of their appearance, make up indeed the real content of all so-called feelings. Thus perceptions, as well as ideas, volition, and feelings, in short the entire inner and outer world, are composed of a small number of homologous elements united in relations now more evanescent and now more lasting. These elements are commonly called sensations. But since vestiges of a one-sided theory now inhere in this term, we prefer to speak simply of *elements*, as we have already done. All research aims at the resolution of the union of these elements.*

XI.

That out of this complex of elements which at bottom is simply *one*, the limits of bodies and the ego do not admit of being fixed in a manner certain and sufficient for all cases, has already been said. The composition of the elements, intimately connected with pleasure and pain, into an ideal mental-economical unity, the ego, is a work of the highest significance for the intellectual functions that act in the service of the pain-avoiding, pleasure-seeking will. The formation of the ego by this process of circumscription and delimitation is therefore instinctively effected, it grows familiar and natural, and fixes itself perhaps through heredity. By their high *practical* value, not only for the individual, but also for the entire race, the composites "ego" and "body" instinctively assert their existence, and operate with the power of original elements. In *special* circumstances, however, in which practical ends are not concerned, but knowledge becomes an object in itself, this delimitation often turns out to be insufficient, obstructive, and untenable.

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* Compare the remarks appended to my treatise: *Die Geschichte und die Wurzel des Satzes der Erhaltung der Arbeit.* Prague. Calve, 1872.

Professional *esprit de corps*, and even professional bias, the sentiment of nationality, the most narrow-minded local patriotism may also have a high value, for certain *purposes*. But such conceptions will not characterise the far-sighted investigator, at least not in the moment of research. All these egoistic conceptions are adequate for practical purposes only. Of course, even the investigator can succumb to custom. Trifling scholastic fiddle-faddle, the cunning appropriation of others' labor and perfidious silence with regard to it, the numerous objections and complaints when unavoidably compelled to give recognition, and the scanty illumination of others' performances on such occasions, abundantly show that the scientist and scholar have also to fight the battle of existence, that the ways of science yet lead to the mouth, and that the *pure* quest of knowledge amid our present social relations is still an ideal.

* * *

The primary fact is not the *I*, the ego, but the elements (sensations). The elements *constitute* the *I*. *I* perceive the sensation green, means, that the element green occurs in a given complex of other elements (sensations, memories). When *I* cease to perceive the sensation green, when *I* die, then the elements no longer occur in their customary, common way of association. That is all. Only an ideal mental-economical unity, not a real unity, has ceased to exist.

* * *

The ego is not an unchangeable, definite, sharply-defined unity. The important factor is not *unchangeability*, not determinate *distinguishability* from other things, and not accurate *limitation;* for all these factors even vary within the sphere of individual life itself, and their alteration is even *sought* by the individual. *Continuity* alone is important. This view admirably accords with that to which Weismann recently attained by biological investigations ("Regarding the Immortality of Unicellular Beings," *Biolog. Centralbl.*, Vol. IV, Nos. 21, 22; compare especially pp. 654 and 655, where the division of the individual into two *equal* halves is spoken of). But this continuity is only a *means* to dispose and to assure the content of the ego. This *content* and not the *ego* is the principal thing. But

this content is not confined to the individual. With the exception of insignificant, valueless, personal memories or reminiscences, it remains preserved in *others* even after the death of the individual. The *ego* is unsavable. It is partly the discernment of this fact, partly the fear of the same, that leads to the most extravagant pessimistic and optimistic, religious and philosophical absurdities. We shall not be able in the long run to close our eyes to this simple truth, the immediate result of psychological analysis. We shall then no longer place so high a value upon the ego which even during individual life greatly changes, and which, indeed, in sleep or during absorption in some conception or in some thought, just in our happiest moments, may be partially or wholly absent. We shall then gladly renounce individual immortality, and shall not place more value upon the accessory elements than upon the principal. We shall in this way arrive at a freer and a *more enlightened* conception of life, which will exclude the neglect of other egos and the over-estimation of our own.

* * *

If, now, the knowledge of the connection of the elements (sensations) does not suffice us, and we must ask *Who, What,* possesses this connection of sensations, *Who, What,* perceives sensations? we have succumbed, we may be sure, to our old habit of arranging every element (every sensation) within some *unanalysed* complex, and we are falling back imperceptibly to an older, lower, and more limited point of view.

* * *

The habit of treating the unanalysed ego-complex as an indivisible unity is often scientifically presented in peculiar ways. First, the nervous system is separated from the body as the seat of sensations. In the nervous system again the brain is selected as fitted for the performance of this function, and finally, to save the pretended psychical *unity,* a further *point* is sought in the brain as the seat of the soul. But rough conceptions like these are hardly adapted to trace out even in the crudest lines the ways that future research will follow in investigating the connection of the physical and the psychical. The fact that the different organs of sensation and memory

are physically *connected* with one another, and can be easily *excited* by one another is probably the foundation of the "psychical unity."

I once heard the question seriously discussed of "How the percept of a very large tree found room in the little head of a man?" Now though this "problem" does not exist, yet we perceive by the question the absurdity that is so easily committed in conceiving sensations to exist spacially in the brain. When I speak of the sensations of *another* person, these sensations of course present no activity in my optical space or my physical space generally; they are mentally added, and I conceive them to be *causally* annexed, not spacially, to the brain observed or represented. When I speak of *my* sensations, these sensations do not exist spacially in my head, but rather my "head" *shares* with them the same spacial field, as was explained above (compare what was said regarding the cut).

* * *

Let there be no mention of the so-called unity of consciousness. Since the apparent opposition of the *real* and the *perceived* world exists only in the mode according to which it is viewed, and no real chasm exists, a multiplex interconnected content of consciousness is in no respect more difficult to understand than the multiplex interconnection of the world.

If we are determined to regard the ego as an actual unity, we cannot extricate ourselves from the following dilemma: either to set over against it—viz., the ego—the world of incognisable substances (which would be wholly idle and purposeless), or to regard the whole world, the egos of other people included, as only contained in our own ego (to which, seriously, we could hardly make up our minds).

But if we take the ego merely as a *practical* unity, composed for purposes of provisional survey; in fact, take it as a more strongly coherent group of elements, which is less strongly connected with other groups of this kind; questions like these will not arise and research will have a free outlook.

In his philosophical notes Lichtenberg says: "We become conscious of certain ideas that are not dependent upon us; and there are other ideas that, at least as we think, are dependent upon

us. Where is the border-line? We know only the existence of our sensations, percepts, and thoughts. We should say, *It thinks*, just as we say, *It lightens*. It is going too far to say *cogito*, when we translate it by *I think*. Assuming the *I*, postulating it, is merely practical necessity." Though the method by which Lichtenberg arrives at this result is somewhat different from our own, we must nevertheless give our assent to the conclusion itself.

XII.

Bodies do not produce sensations, but complexes of sensations (complexes of elements) form bodies. If bodies appear to the physicist as that which is permanent, that which is real, and sensations as their evanescent transitory semblance, the physicist forgets that all bodies are but thought-symbols for complexes of sensation (complexes of elements). The *elements* designated also form here the real, immediate, and ultimate foundation which physiological research has now further to investigate. Through the discernment of this, many things in psychology and physics assume more distinct and economical forms, and many imagined problems are disposed of.

The world therefore does not consist for us of mysterious substances, which through their interaction with another equally mysterious substance, the ego, produce sensations as solely accessible. Colors, sounds, spaces, times, . . . are for us the ultimate elements, whose given connection it is our task to investigate. In this investigation we dare not allow ourselves to be hindered by the composites and circumscriptions (body, ego, matter, mind . . .) that have been formed for especial, practical, provisional, and limited purposes. On the contrary, the appropriate and best adapted forms of thought must arise within research itself, as happens in every special science. In the place of the traditional instinctive conception must come a freer, fresher view, conforming with developed experience.

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I have always felt it as a special good fortune, that early in my life, at about the age of 15, I came across in the library of my

father Kant's "Prolegomena to Any Future Metaphysic." The book made at that time a powerful, ineffaceable impression upon me, that I never afterwards experienced to the same degree in any of my philosophical reading. Some two or three years later I suddenly discovered the superfluous rôle that "the thing in itself" plays. On a bright summer day under the open heavens the world together with my ego all at once appeared to me as *one* coherent mass of sensations, but in the ego more strongly coherent. Although the actual working out of this thought did not occur until a later time, yet this moment became decisive for my whole view.

Moreover I had still to struggle long and hard before I was able to retain, in my own special department, the conception I had acquired. With what is valuable in physical doctrines we necessarily absorb a good dose of false metaphysics, which it is very difficult to separate from that which must be preserved, especially where these doctrines have become current and familiar. So, too, the traditional, instinctive conceptions often arose with great power and placed impediments in my way. Only by alternate studies in physics and the physiology of the senses and by historico-physical investigations, since about 1863, after having endeavored in vain to settle the conflict by a physico-psychological monadology, did I acquire in my views any considerable firmness. I make no pretensions to the title of philosopher. I only wish to adopt in physics a point of view that need not be instantly changed the moment our glance is carried into the domain of another science; since indeed, ultimately, all must form one whole. The molecular physics of to-day does certainly *not* meet this demand. What I say I have probably not been the *first* to say. I also do not wish to hold forth this exposition of mine as a special performance. It is rather my belief that every one will collaterally adopt the same view, who in a reflective manner holds survey in any province of science that is not too limited.*

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* I have recently (1886) propounded these views in a pamphlet *Beiträge zur Analyse der Empfindungen.* Avenarius, with whom I recently became acquainted, approaches my point of view *(Philosophie als Denken der Welt nach dem Princip des kleinsten Kraftmasses,* 1876). Hering, too, in his treatise upon Memory *(Almanach*

XIII.

Science always arises through a process of adaptation of thoughts to a certain department of experience. The results of this process are thought-elements, which represent the entire department. The result, of course, is different according to the character and extent of the province surveyed. If the province of experience in question is extended, or if several provinces hitherto separated become united, the traditional, familiar thought-elements no longer suffice for the province thus extended. In the struggle of acquired habit with the effort after adaptation, *problems* arise, which disappear when the adaptation is completed, to give way to others that have sprung up in the mean time.

To the physicist, pure and simple, the idea of a body facilitates the acquisition of a comprehensive survey in his department, and does not operate as a disturbance. So, also, the person that pursues purely practical ends, is materially assisted by the concept of of the *I* or Ego. For, unquestionably, every form of thought that has been voluntarily or involuntarily constructed for some especial purpose, possesses for that particular purpose a *permanent* value. As soon, however, as physics and physiology touch, the ideas held in the one domain are discovered to be untenable in the other. From the striving after an adaptation of the one to the other arise the various atomic and monad theories—which are unsuccessful, however, in the attainment of their object. If we regard *sensations*, taken in the sense above defined, as *world-elements* or elements of the All, the problems referred to are practically removed, and the *first* and most important adaptation therefore effected. This basal notion (without any pretension to being a philosophy for all eternity) can at present be adhered to with respect to all provinces

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der Wiener Akademie, 1870, p. 258; also published in Nos. 6 and 7 of *The Open Court*), and J. Popper in his beautiful book, "The Right to Live and the Duty to Die" (Leipsic 1878, p. 62), have advanced similar thoughts. Compare also my paper *Ueber die ökonomische Natur der physikalischen Forschung* (*Almanach der Wiener Akademie*, 1882, p. 179, note). Finally let me also refer here to the introduction to W. Preyer's *Reine Empfindungslehre*, and to Riehl's *Freiburger Antrittsrede*, p. 14. should probably have to cite much additional matter that is in some way related to my line of thought if I possessed a more extensive bibliographical knowledge.

of experience; it is consequently the one that accommodates itself with the least expenditure, that is, more economically than any other, to the present *temporary state of collective science.* Moreover, in the consciousness of its purely economical office, this basal notion acts with most perfect tolerance. It does not obtrude itself into provinces in which the current conceptions are still adequate. It will ever be ready, upon subsequent extensions of the domain of experience, to give way to a better one.

The philosophical point of view of the average man—if that term may be applied to the naïve realism of the ordinary individual—has a claim to the highest consideration. It has arisen in the progress of immeasurable time without the purposed assistance of man. It is a product of nature, and is preserved and sustained by nature. Everything that philosophy has accomplished—the *biological* title of every advance, nay of every error, admitted—is, compared with *it*, but an insignificant and ephemeral product of art. And in reality, we see every thinker, every philosopher, the moment he is forced away from his one-sided intellectual occupation by some practical necessity, immediately fall back upon the universal point of view that all men hold in common.

We seek by no means to discredit this point of view. The task that we have set ourselves is simply to show *why* and to what *purpose* for the greatest part of our life we occupy this point of view, and *why* and for what *purpose* we are provisorily obliged to abandon it. No point of view has an absolute *permanent* validity. Each has an importance but for some one given end.

ERNST MACH.

THE ORIGIN OF MIND.

WE must distinguish between two kinds of facts; viz., given facts or data, and deduced facts or inferences. With regard to the facts of soul-life we recognise that the former class, that of given facts, necessarily consists of states of consciousness only; they are feelings of any description, varying greatly in their nature. They are different in the rhythmical forms of their vibrations, in their intensity, and in their distinctness. The latter class, that of inferences, is deduced from the former, and serves no other purpose than that of explanation. This class is mostly representative of external facts, and knowledge of external facts exists only in so far as external facts are represented in deduced facts. What a thinking being would call external facts is nothing but the contents of certain deduced facts.

Given facts and deduced facts.

Deduced facts, and among them the conception of external facts (wherever they exist), have been produced by the effort of accounting for given facts—viz., the elementary data of consciousness and their relations. Deduced facts are the interpretation of given facts. They are, so to say, conjectures concerning their causes as well as their interconnections.

The organised totality of deduced facts, as it is developed in feeling substance, is called mind. Feelings are the condition of mind. From feelings alone mind can grow. But there is a difference between feelings and mind. Feelings develop into mind, they grow to be mind by being interpreted, by becoming representative. Representative feelings are mind. Accordingly, we characterise mind as the representativeness of feelings.

Definition of mind.

The growth of mind

Although deduced facts are an interpretation of given facts, this "interpretation" is not expressly designed. These inferences from given facts are not invented with a premeditated purpose; they are not constructed with foresight or intention. Deduced facts grow naturally and spontaneously from given facts, which are the elements of sense-activity. There is not an agent that oversees their fabrication; there is not a devising "subject" that surmises the existence of external facts and thus matures their conception into deduced facts. Deduced facts are rather the natural product of a certain group of given facts. Deduced facts issue from a co-operation of a number of feelings. They are the result of an organisation of certain repeated sense-impressions which produce a disposition not only to receive sense-impressions of the same kind, but also to react upon them in a certain way. Mind is not the factor that organised the given facts of mere sense-impressions so that they became representations. There was no mind as long as feelings remained unorganised. Feelings acquire meaning; and as soon as they have acquired meaning they are what we call "deduced facts," representations —especially representations of external facts. Deduced facts are the elements of mind; and mind is not their root, but their fruit.

Subjective and objective existence.

The whole domain of mind-activity (i. e., of the representativeness of feelings) is called subjective; while the totality of all facts that are represented in the mind is called objective. Subjective existence consists of feelings and of states of consciousness; objective existence is represented as things that are in motion. Motion and feeling are quite different things, yet in spite of their radical difference experience teaches us that both spheres are intimately interwoven. Subjective existence constantly draws upon objective existence. Not only do states of consciousness exist as they are by virtue merely of the objects represented, but also that group of facts called our body, the action of which appears in a constant connection with and as a condition of our consciousness, is kept in running order only through a constant renewal of its waste products out of the resources of objective existence.

We distinguish between our body and external facts; but the boundary between both provinces is not distinct. There is constantly an exchange of substance taking place, proving that our body is in kind not different from the substance of which external facts consist. It must be regarded as a group of the same kind as external facts, existing in a constant interaction with and among the external facts. In other words, the body of the thinking subject is an object in the objective world.

The origin of feeling from the elements of subjective existence.

Concerning the subjective sphere of existence we recognise that consciousness does not act uninterruptedly; there are moments when consciousness is lost. If they are normal, we call them sleep; if they are abnormal, swoons or trances. Former conscious states can be revived; they form a chain of memories which is very limited in comparison with the extension of the objective world. There is a time in the past beyond which our memory does not reach. Moreover we have reason to believe, that there will be a time when the chain of conscious states will be broken forever. This consummation is called death. In short the subjective world is transient; it grows by degrees; its existence is very precarious; it flickers like a candle in the wind and will disappear again. The objective world however is eternal, it is indestructible. Experience teaches that it constantly undergoes changes, but that in its totality it is imperishable.

Feeling with the help of memory acquires meaning

The objective world is in a certain sense a part of the subject. In another sense, we must say that the subject is a part of the objective world. Indeed these two sentences represent the same truth, only viewed from two standpoints. The subjective world being transient and the objective world being eternal, the question presents itself, "How does the subject originate in or among the objects of the objective world?"

The problem is complicated and we must approach it step by step. First, we are inevitably driven to the conclusion, that the subjective world of feelings forms an inseparable whole together with a special combination of certain facts of the objective world, namely our body. It originates with this combination, and disappears as soon as that combination breaks to pieces. And, secondly,

we must assume that the conditions for building up such material dispositions as have the power of developing the subjectivity of consciousness are an intrinsic quality of the objective world. Subjectivity cannot originate out of nothing; it must be conceived as the product of a co-operation of certain elements which are present in the objective world. In other words, the elements of the subjective world are features that we must suppose to be inseparably united with the elements of the objective world, which are represented in our mind as motions. This leads to the conclusion that feeling has to be considered not as a simple but as a complex phenomenon. Feelings originate through a combination of elements of feeling; and the presence of the elements of feeling must be supposed to be an intrinsic property of the objective world.* The objective elements, the action of which is accompanied with the elements of feeling, arrange themselves, we suppose, into such combinations as display actual feelings, in exact agreement with the laws of molar and molecular mechanics. This, we must assume, takes place with the same spontaneity as, for instance, an acid and a base combine into a salt. To use another example, it takes place with the same necessity as, under special conditions, a certain amount of molar motion is transformed into the molecular motion of ether-waves, called electricity. Motions are not transformed into feelings, but certain motions (all being separately accompanied with elements of feeling), when co-operating in a special form, are accompanied in that form with actual feelings.

Neither feeling nor mind can be considered as incidental phenomena.

There is a certain class of philosophers who look upon feeling as an incidental effect, as a fortuitous by-play of the interacting elements of matter. This conception has little if anything in its favor. On the contrary, if the elements of feeling are throughout inseparably connected with the elements of objective existence, it must appear natural that wherever the conditions fitted for organised life appear, irritable substance will originate. We may fairly assume that feeling will

* For further details see the author's article *Feeling and Motion;* published first in *The Open Court*, Nos. 153 and 154.

arise on the cooled surface of a planet with the same necessity as, for instance, a collision between non-luminous celestial bodies will cause them to blaze forth in the brilliant light of a nebula containing all the elements for the production in the course of ages of a planetary system.

Wherever a combination of substances originates that displays the quality of feeling, it will form a basis for given facts of soul-life. Feeling substance having been exposed to a special stimulus, or having performed a certain function, has thereby undergone a rearrangement in its molecular parts. The structure has suffered a change in its configuration, the form of which is preserved in the general flux of matter, and there is thus produced in the feeling substance a disposition to respond more quickly to impressions of the same kind. The feeling accompanying a subsequent impression of the same nature is coincidently felt to be a revival of a former feeling, similar or the same in kind. In other words, feeling substance, preserving the forms of its functions, is possessed with memory.* The preservation of form in a function which is accompanied with feeling makes it possible that the feeling accompanying a special form of function will become a mark of signification. By being felt to be the same in kind as a former feeling it will come to denote a certain condition of feeling tissues. A feeling that is felt to be the same as or similar in kind to a former feeling, the revival or memory of which it causes, is in this way endowed with meaning; by which we understand the awareness of the congruence or similarity of two or several feelings. Thus in the lapse of time, by constantly renewed experience, one special feeling, whenever repeated, will naturally become the indicator showing the presence of certain external facts that cause it. An isolated feeling is naturally meaningless; yet through a preservation of form, viz., through memory, it is by repetition necessarily changed into a symbol of representative value.

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* Memory is no mysterious power; it is the preservation of form in feeling organisms. See Ewald Hering's treatise on Memory, English translation in Nos. 6 and 7 of *The Open Court*. Compare also the author's article *Soul-life and the Preservation of Form*, in No. 143 of *The Open Court*.

Feelings, accordingly, in the course of time, necessarily acquire meaning; they naturally and spontaneously develop mind. They can as little avoid co-ordinating into a mental organism, as water at a low temperature can escape congealing into ice; or as a seed can keep from sprouting when it is exposed, with sufficient moisture, to the light. Mind, accordingly, is the necessary outcome of a combination of feelings. It is as necessary an effect of special causes, as, for example, a triangle is the product of a combination of three lines. The first step in the organisation of feeling, which will throughout remain the determining feature of its development, is the fact that with the help of memory the different sets of feeling acquire meaning, and in this way the mere feelings are transformed from given facts into deduced facts.

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Subjectivity and objectivity.

The nature of given facts is subjectivity, while the character of inferred facts is objectivity. The latter having grown out of the former will nevertheless, so far as they are states of consciousness, always remain subjective; yet they contain representations of that which is delineated by certain given facts. Thus they contain an element which stamps upon them the nature of objectivity. They represent objects, the existence of which the feeling subject cannot help assuming, because this is the simplest way of indicating certain changes that are not caused within the realm of its own subjectivity.

Objectivity, accordingly, does not mean absolute objectivity. Objectivity means subjective states, i. e, given facts or feelings representative of outside facts, i. e., of facts that are not subjective, but objective.

The projection of objective facts.

The sense-impression of a white rectangle covered with little black characters is a given fact; yet the aspect of a sheet of paper is an inferred fact. The former is a subjective state within; the latter is the representation of an objective thing without. The process of representing is a function of the subject, but the fact represented is projected as it were into the objective world, where experience has taught us to expect it. And the practice of projection grows so naturally by inherited adaptation and

repeated experience that the thing represented appears to us to be external. We no longer feel a sensation as a state of consciousness but conceive it as an independent reality.

Projection, an economy of labor.

The practice of projecting subjective sensations into the outside world is not an act of careless inference, but the inevitable result of a natural law. This natural law is that of the "economy of labor." When a blind man has undergone a successful operation, he will first have the consciousness of vague color-sensations taking place in his eye. Experience will teach him the meaning of these color-sensations and his motions will inform him where to find the corresponding outside facts. His consciousness will more and more be concentrated upon the meaning of the sensations. The less difficulty he has in arriving at their proper interpretation, the more unconscious his sense-activity will become and at length consciousness will be habitually attached to the result of the sensation alone, i. e., to its interpretation.

In the same way, every one who learns to play an instrument will first feel that part only which his hand touches. By and by, however, he will acquire a consciousness of the effects produced by the slightest touch. Constant practice forms in the brain of an expert certain living structures which are correspondent to the action of the instrument and represent it with great accuracy. Whenever these structures are stimulated, the action of the instrument is felt to take place. In this way consciousness is projected into the work performed by the instrument. The touch of the hand has become purely automatic, and the operator now feels the full effects of his manipulation although he is not in direct contact with all the parts of his instrument. The instrument becomes as if alive under his treatment, he feels it as a part of himself; for its action stands *en rapport* with his brain-activity.

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The subject-superstition and agnosticism.

States of consciousness, collectively considered, have been termed "subject," and we have also employed the phrase "subjective world." But we must not forget the fact, that the adoption of the name "subject" is based upon a misconception. Subject means "that which underlies," and the

subject was supposed to be that something which formed the basis of all the states of consciousness present in any one special case—in you or in me, or in any person like you and me. The subject was considered as a being that was in possession of sense-impressions, of feelings, of thoughts, of intentions, etc.; and the existence of this subject was proved by Descartes's famous syllogism *Cogito ergo sum.* The subject was supposed to produce the states of consciousness, while in fact (as we have explained above) it is exactly the opposite. Feelings change into mind, they produce the subject which thinks. The subject is nothing underlying but rather overlying. It is the growth out of and upon feelings. It is the sum of many feelings in a state of organisation.

The fallacy of Descartes's dictum has been pointed out by Kant. The existence of states of consciousness, or the fact *cogito*, does not prove the existence of something that underlies the states of consciousness. It simply proves the existence of feelings and thoughts. There are certain sense-impressions, there are perceptions, there are ideas. Ideas develop from perceptions, and perceptions develop from sense-impressions. States of consciousness are nothing but the awareness or the feeling that is connected with certain perceptions and ideas.

Descartes's subjectivism is a transitory phase leading from the authoritative objectivism of the middle ages to the critical objectivism of modern times. The authoritative philosophy of the Schoolmen yielded to the arbitrary philosophy of metaphysical subjectivity, commencing as a matter of principle with doubt, instead of commencing with positive data, and establishing anarchy through lack of any objective method of arriving at truth. The reaction against the arbitrary authority of scholasticism was indispensable to further progress. But we must not rest satisfied with its negative result. We cannot commence a business without capital and without making a start. So we cannot begin philosophy with nothing. Knowledge is not possible without positive facts to serve as a basis to stand upon.

The negative features of Descartes's philosophy naturally found their ultimate completion in agnosticism. The assumption of the

existence of a subject led to the doctrine, that this subject is unknowable. Moreover, the assumption of something that underlies the acts of thought leads to the assumption of something that underlies objective existence, and thus it begets the theory of things in themselves. This theory involves us in innumerable contradictions and thus it ends ultimately in the proposition that things in themselves are unknowable.

There are few who know the historical meaning of agnosticism; but those who can survey philosophical thought in its evolution, its growth, and decay, know that agnosticism means failure in philosophy. The word is a foreign-sounding name for "knownothingism," denoting a half-concealed confession of bankruptcy. The philosophy of the future, in order to escape from the fatal consequences of agnosticism, has to discard the subject-superstition inherited from Descartes. Descartes was a great thinker, a star of first magnitude in the realm of thought, but it is time that, without returning to the authoritative philosophy of the Schoolmen, we should free ourselves from the errors of his one-sided subjectivism.

Let us not forget, that all subjective states contain an objective element. Objectivity is no chimera, and we are very well enabled to establish the truth or untruth of objective facts. The philosophy of the future, accordingly, will be a philosophy of facts, it will be *positivism;* and in so far as a unitary systematisation of facts is the aim and ideal of all science, it will be MONISM.

From the standpoint of positivism, the subject, in the old sense, does not exist, and things in themselves do not exist either. Their existence is an unwarranted assumption, a superstition of philosophy, and we can retain the word subject only on the condition of a complete change of its meaning. The word subject, accordingly, (which has acquired a place in philosophical language and is for several purposes quite an appropriate expression,) must be corrected so as to mean, not an underlying substratum, nor an agent which does the thinking, but simply a collective term designating a certain group of sense-impressions, perceptions, ideas, and volitions. These sense-impressions, perceptions, ideas, and volitions, which form, simultaneously as well as successively, the elements of

soul-life, carrying consciousness upon the waves of many subconscious states, make up the reality of the subject; they are the facts of its existence, and it is the states of consciousness only, not an underlying something, the existence of which is beyond all doubt. They form the basis of all knowledge.

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The objective element in subjective states.

We must bear in mind that states of feeling are not empty feelings, but always feelings of a certain kind. There is no consciousness pure and simple, but only consciousness of a certain state. Let us suppose, for instance, the consciousness of a certain pressure. What is it but a feeling of being pressed in a certain direction and with a certain intensity? If a certain pressure is resisted, the feeling indicates a state of active reaction against pressure, and experience teaches by comparison with other pressures how much counterpressure is necessary to resist or overcome it.

Among the states of consciousness there are accordingly some that represent an awareness of *receiving* impressions, and there are others of *making* impressions. There are some feelings of a passive nature, which are felt to be produced by impacts from a something that is not the subject, and there are other feelings of an active nature, which are felt to produce effects on something that is not the subject. This something that is not the subject is called "object." It is represented as lying outside the subject, although the latter stands in a close and inseparable relation to the object, which, so far as this relation is considered, forms a part of the subject. A given subjective state possesses a definite form; it exists as it is on account of the object only; for its form has been produced by its relation to the object, and it represents this relation. The object, therefore, is no unimportant part of, and indeed is an essential element in, the constitution of the subjective state.

All data are states of subject-objectness.

Idealist philosophers are apt to say that the subject alone is known to us, while the existence of the object must forever remain a vague hypothesis. This, however, is incorrect. It involves an unjustifiable deprecation of the objective element in the given facts of conscious states, and is based on

a misconception of the entire state of things. The data of knowledge are not mere subjective states, they are relations between subject and object. Neither the subject is given, nor the object; but an interaction between subject and object. From this interaction we derive by a very complicated process of abstraction both concepts, the subject as well as the object. It is true that the subjective world of feelings and of representative feeling is very different from the objective world of things. Nevertheless they are one. The subject together with all objects forms one inseparable whole of subject-object-ness.

Every special object, accordingly, must be conceived as a part of this inseparable whole—of the All; it is a certain set of facts, represented in a certain group of experiences, and is to be described as that something which in a special way affects the subject and can again in a special way be reacted upon by the subject.

Here we have the clue for the proper meaning of objectivity. What is a piece of lead but something that at a definite distance from the centre of the earth exerts a certain pressure proportionate to its mass; that is seen to become liquid at a certain temperature; etc., etc.? If it is treated in a particular way, it will be observed to suffer certain changes. What lead is has been established by experience; i. e., by systematic observation through sense-impressions.

Idealism and realism.

From this standpoint the differences between the schools of idealism and realism appear as antiquated. The questions whether matter is real, whether objects exist, and whether there is any reality at all, have lost their meaning. That which produces effects upon the subject and against which the subject does or can react, is called object. The sense-effects produced by the object upon the subject, and also the reactions of the subject upon the object, are realities; and every name of a special object signifies a certain group of such effects and their respective reactions. Thus, for instance, the word lead comprises a certain set of experiences that have always been found combined with certain whitish objects.

Some philosophers have denied not only the existence of objects, but also the reality of space. What is space but a certain

group of experiences? The conception of space originates by moving and by being moved about. The conception of space is the consciousness that by moving, or by being moved, a change is effected; that is, a certain object serving as a point of reference is either approached or left at a greater distance. The acts of approach or withdrawal are as much realities as are any other acts of the subject. Discussions concerning the reality of space accordingly become mere verbal quibbles as soon as we understand by space the condition common to all motion-experiences.

Space and Reality.

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The mental state in which through contact with external facts one or several of the senses are affected so as to produce a direct awareness of their presence, is called perception. The effects of external facts upon the sense of touch appear as different forms of resistance. To the other senses they appear as odors, tastes, sounds, and images. All these sensations are so many subjective methods of representing certain objective processes. Perceptions represent immediate reality because the objects perceived, i. e., the objects represented by an image in the eye, a taste on the tongue, etc., are in an immediate contact with our senses. The feeling subject is directly conscious of their existence by their present effects. They are our *Anschauung*, i. e., the living presence of objective reality.

Perception and concepts.

Besides this living presence of objective reality, of which our immediate surroundings consist,—besides our *Anschauung*—, man is in possession of more general representations, which comprise all the memories of a certain class of percepts. We call them concepts. Man alone through the mechanism of word-symbols has been able to form concepts. Abstract reasoning as well as scientific thought will grow with the assistance of concepts in the course of a higher development.

The higher we rise in the evolution of representative feelings, i. e., in the development of mind, the more numerous are the opportunities for going astray. A scientific hypothesis, if erroneous, is more sweeping in its fallacies than a single

Hallucinations and errors

hallucination, which is a misinterpretation merely of certain feelings. The subjective part of an hallucination, namely the feeling itself, is real; but the objective part, the representative element of the feeling, is not real; that which it is supposed to mean, does not exist. The interpretation of the feeling is erroneous in a hallucination.

Hallucinations are possible, and in the more abstract domains of mental activity errors are possible also; and will be ever more frequent. Nevertheless the reality of outside facts in the sense stated above can as little be doubted as the reality of immediate perception; and all the facts established by science, if they are but true, are as much realities as is the resistance of the table to the pressure of my hand or the perception of the sheet of paper by my eye.

Inferential facts, if true, are real.

Facts established by science are those observations which are made with all the necessary exactness as well as completeness from certain groups of experiences, and formulated with precision. The theory of atoms, for instance, is true in so far as all elements combine in certain proportions, which shows that the ultimate particles of which the elements consist are of a definite mass. Atoms, if the word is understood in this sense, are realities. The theory of atoms, however, is not proved in the sense that atoms are *ἄτομοι*; or single, isolated, minute bodies of a peculiar individuality—separate, indivisible, and eternal entities. Whether they are concrete things or certain forms of motion in a continuous substance, whether they are vortices or whirls of a certain density and velocity in an ether ocean, or whatever else be their character, is not yet known. If we exclude from the concept "atoms" all hypothetical views and confine their meaning strictly to the formulation of certain experiences, we have to deal with facts that are real. Theories are true in so far as they comprehend in a formula a certain group of facts, and a hypothesis becomes reliable to the extent that it agrees with facts. The slightest actual disagreement with facts is sufficient to overthrow the most ingenious hypothesis.

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This leads us to the question, What is meant by *true?* What is truth?

Facts and reality. Truth and mind.

The epitheton "true" has reference to representative states only. A representation is true, if it conforms to, or agrees with, experience; in other words, if it is an interpretation of given facts, is free from contradiction, and nowhere collides with any one of the given facts and their consistent interpretation. There is no sense in speaking of mere feelings as being true. We can never meet, in our own experience, with given facts that are nothing but meaningless feelings; for we (as thinking beings) are incapable of bringing meaningless feelings into the scope of consciousness, since in the very act of thinking we comment upon the given facts of our feelings. But supposing there are mere given facts, mere meaningless feelings void of any representative element, the application of the word true to such non-representative feelings would be improper. States of consciousness become true or untrue only by being representative of objective conditions or things. There is no trace of truth in mere feelings, but only in representative feelings. Truth and error are the privilege of mind. A representation is true, if all the various experiences concerning a certain thing or state of things agree with the representation; it is untrue if they do not agree.

We observe that certain classes of facts, in spite of all variety, exhibit in one or another respect a sameness, and science attempts to express the sameness in exact formulas. These formulas we call natural laws. If a natural law covers all cases of a class that have come or even that possibly can come within the range of our experience, if it agrees with every one of them, we call it a truth.

"Truth" accordingly is not at all identical with "fact." These two words are often used as synomyms, but properly employed they are quite distinct. Truth is the agreement of a representation with the facts represented. The fall of a stone is a fact; it is an inferred fact deduced from certain sense-impressions. In so far as the inference is made with necessity as the only proper and simplest explanation of a certain given fact or sense-impression, it must be

considered as a fact or as real. The law of gravitation, however, is not a fact, but a truth.

Facts are real. There is no sense in speaking of facts as being true. Representations of facts are true or untrue. Reality is the characteristic feature of all facts, but truth is a quality that can reside in mind alone.

Facts and truth.

Facts are always single, concrete, and individual. Every fact is a *hic* and *nunc*. It is in a special place, and it is as it is, at a certain time. It is definite and of a particular kind. Yet a truth, although representing certain objects or their relations, is never a concrete object, nor is it a *hic* and a *nunc*. It possesses a generality applicable to all instances wherever and whenever the objects in their particular relation appear represented in that truth. Truth accordingly possesses as it were an ubiquity; it is omnipresent and eternal.

Truth in one sense is objective; it represents objects or their relations conceived in their objectivity, in their independence of the subject. This means that the representation of certain objective states will under like conditions agree with the experiences of all subjects—i. e., of all feeling beings having the same channels of information.

Truth in another sense is subjective. Truth exists in thinking subjects only. Truth affirms that certain subjective representations of the objective world can be relied upon, that they are deduced from facts and agree with facts. Based upon past experience, they can be used as guides for future experience. If there were no subjective beings, no feeling and comprehending minds, there would be no truth. Facts in themselves, whether they are or are not represented in the mind of a feeling and thinking subject, are real, yet representations alone, supposing they agree with facts, are true.

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The problem of the origin of mind.

Mind, or the representation of facts in feeling substance, is the creation of a new and a spiritual realm above the facts of material existence. By spiritual we understand feelings that are representative; and we say that it is a new creation because it does not exist in the isolated facts of the world. It is formed

under special conditions. It rises from certain combinations of facts; being built upon those facts which produce in their co-operation the subjective state of feeling. The activity of mind if methodically disciplined is called science. Science attempts to make the mental representations correct: it is the search for truth. The object of all the sciences and of philosophy is to systematise knowledge, i. e., all the innumerable data of experience, so that we can understand and survey the facts of reality in their harmonious interconnection. The most important problem of philosophy has always been the problem of the origin of mind; for we are anxious to comprehend how it is possible that feeling can spring up in a universe of not-feeling objects, and that thinking beings can originate in a world of not-thinking elements.

Dualism assumes that the gulf between the two empires, the thinking and feeling on one side and the not-thinking and not-feeling on the other side, is insurmountable; Monism however maintains that there is no gulf, for there is no reason for such an assumption. Both realms, the feeling and thinking on the one hand, and the unfeeling and unthinking on the other hand, are not at all distinct and separate provinces. The transition from the one to the other takes place by degrees, and there is no boundary line between them. The atoms of oxygen which we inhale at present are not engaged in any action that is accompanied with feeling, but some of them will be very soon active in the generation of our best thought accompanied with most intense consciousness. After that they are thrown aside in the organism and pass out as waste products in the shape of carbonic acid.

Telepathy.

The spiritual originates from and disappears into the non-spiritual not otherwise than light originates out of, and dissolves again into, darkness. Light is usually considered as the emblem of mind, for light also discloses to our eye those objects which are so far away that we can never expect to touch them with our hands. So mind, the representation of the objective world in feeling substance, unveils the riddles of the universe and shows the secret connections of most distant things and events.

Spiritualists discuss with great enthusiasm the problem of telep-

athy. Telepathy means "far-feeling." Mental activity exhibits in all its elements instances of telepathy in the literal sense of the word. We do not feel our sense-organs; but in and through our sense-organs objects outside of us are felt. In and through our eyes most distant stars are seen. If telepathy has no other but its natural and proper meaning we must confess that the whole activity of the mind rests upon telepathy.

However, we cannot recognise telepathy in the sense in which the word is often employed by spiritualists. With many it denotes a process of such far-feeling as is not caused in the natural way and as stands in contradiction to the mechanical interconnection of causes and effects in the universe. It is supposed to supersede the order of nature. We recognise telepathy fully in the sense that feelings represent distant events and that mind can thus penetrate into the remotest regions of time and space, but not in any other sense that stands in contradiction with the universal order of mechanical causation.

What is the soul but a telepathic machine! It is an organised totality of representations in feeling substance employed for the purpose of reacting appropriately upon the stimuli of external things. Man is a part of the cosmos, he consists of a certain group of facts, belonging to and being in intimate connection with the whole universe. Man's mind is the cosmos represented in this special group of facts. A correct representation of the cosmos includes a proper adaptation. Accordingly the human soul is a microcosm and its function is the endeavoring to conform to the macrocosm.

Mind and light.

Light is a most wonderful phenomenon; and yet we know that the objective process taking place in luminous bodies and thence transmitted through ether vibrations to our eye where it causes the sensation of light, is a mode of motion that can be produced mechanically by changing simple or mechanical motion (i. e., change of place) through friction into molecular motion. As light originates out of darkness, being a special mode of motion, so feeling originates out of the not-feeling. The not-feeling accordingly contains the conditions of feeling in a similar way as potential energy contains the potentiality of kinetic energy,

or as molar motion contains potentially the molecular motion of heat, light, and electricity.

Mind sheds light upon the interconnection of all things and gives meaning to the world. If the world consisted of purely objective facts only, it would remain a meaningless play of forces. Mind and the whole realm of spiritual existence rises from most insignificant beginnings; yet is it so grand and divine because it represents the world in its wonderful harmony and cosmic order.

The function of spiritual activity appears to us as transient; but mind is not as transient as it seems. The continuous light of a flame depends in every instance upon the conditions of the moment. But the continuity of mind shows a preservation of mind-forms, the corresponding spiritual activity of which is called memory. Memory or the mind-form of former states is the most important factor in the determination of the representative value of present states of mind. The continuity thus effected makes it possible for mind to represent not only things and processes distant in space, but also those distant in time.

Continuity in the transient.

The continuation of form in feeling substance, not merely in the life of single individuals, but also in the life of the race, produces the growth, the development, and evolution of mind. Thus facts can be represented in their connections, and the necessity of their connection can be understood. To use Spinoza's phrase: The world can be viewed *sub specie æternitatis.*

The fulfilment of mind is truth, or a correct representation of facts, not as they are now and here, but as, according to conditions which constitute a given state of things, they must be here and everywhere. Mind expands in the measure that it contains and reflects the eternity of truth.

Mind and Eternity.

The activity of mind is in one respect as transient a process as is the phenomenon of light. Yet in other respects mind is able to grasp eternity within the narrow span of the moment.

PAUL CARUS.

THE MAGIC MIRROR.

THE famous time-honored saying of Rabbi Ben Akiba, "There is nothing new under the sun," has often been verified to our astonishment in the history of the sciences. No observation is proclaimed that has not been made before, no position upheld that has not been before maintained. The more extensive the survey that one acquires over any given province of science, and the more deeply one penetrates into the past history of that science, the more surely will one arrive at the conviction, that even that which is apparently very new is at bottom old.

But the unceasing progress of the natural and mental sciences, on the other hand, is an indisputable fact; and the true characteristic of this progress must consequently be sought in some other element than in the accession of new material. The subject-matter with which science deals, remains almost unchanged throughout prolonged periods of time; the treatment of that material alone changes. Accordingly, the factor that determines the extension of our knowledge is pre-eminently the growing comprehension that proceeds from the illumination of that which was before in our possession. Apples fell from trees in all ages, but Newton was the first who placed the event in its proper light, thereby creating a tangible principle by means of which a great number of other phenomena were successfully apprehended. Our system of scientific ideas was increased by the addition of one conception that illuminated phenomena hitherto but half or not at all explained.

Even the most enthusiastic advocate of the present state of

knowledge cannot maintain that it is perfect. On the contrary, he will recognise that an advance of the barriers that separate that which is now understood from what is not understood, is not only possible, but even on his part devoutly to be wished. Indeed, a very large province of knowledge—that of superstition—still remains almost wholly unworked. It is absurd to imagine that all the tales of magic and demonology are founded entirely in deception. For how could it happen that in all historical epochs, and among all the peoples of the earth, the same phenomena should be uniformly reported, if something true and real were not concealed behind it all! The illuminate, of course, looking upon our present code of ideas as ultimate, shrugs his shoulders with a superior air and banishes what to him is "supernatural" into the realm of fables; the cautious observer, on the other hand, refrains from passing judgment thus prematurely, for he knows that departments formerly very extensive have passed out of the realm of superstition into the kingdom of science, and that in the future the same will also occur. Thus the divine summons in the mediæval trial by ordeal have turned out to be effects of suggestion, and the majority of the performances of witches have proved to be the effects of hysterical temperament. So that we are now in a position to comprehend the tales of the Magic Mirror* in their true light and to bring them, without constraint, into accord with the doctrines of a developed science of psychology.

A brief recountal of the most important of the stories of this kind, must be prefaced by the paradoxical statement that the Magic Mirror need not by any means be a mirror. People are also reported to have seen future and distant things in shining metal surfaces, in rock-crystals, and in glasses filled with water. The Old Testament mentions a divination made by the radiance of *gems*—where it speaks of Urim and Thummim, the breast-ornament of six bright and six dark stones which the high priest donned to receive revelations from Jehovah. In a like manner, too, in *dactylo-*

*The Japanese "Magic Mirrors" consist of ingenious physical contrivances and are in no way concerned with our present subject.

mancy (divination by rings) the abnormal condition is said to have been induced by fixedly gazing at the stones of finger-rings. Likewise in the Bible we find an instance of divination by means of polished metal cups; for according to the Septuagint, the cup that Joseph caused to be placed in the sack of Benjamin, was the cup from which he was wont to divine. Instead of cups, use was also made of metal balls, arrows, swords, knives, and metal mirrors. Even Jacob Böhme practised the art of clairvoyance by the help of the "lovely jovial lustre" of a tin cup, "with the result that he was now introduced into the innermost depths or centre of recondite nature, and was enabled to look into the hearts and innermost character of all creatures."

When gold and silver leaves marked with mysterious characters were thrown into a basin filled with water, and it was sought by gazing at the surface thus furnished, to arouse the "higher powers," the art was called *lecanomancy*. If the surface of the water alone was gazed at, it was called *hydromancy;* a method which communicated oracles by means of the images that appeared in the water.

The only distinction between hydromancy and *gastromancy* was, that in the latter case the water was poured into distended vessels. Cardanus has minutely described some gastromantic experiments that came under his observation. A bottle filled with holy water was placed in the sun upon a white-covered table; over the mouth of the bottle two olive leaves were laid crosswise; three lighted wax candles were then placed about the leaves and fumigated with incense, during which performance a prayer to Saint Helena was uttered. Very soon the mantic adepts standing in the background saw forms in the water; once a man with a bald head, slightly inclined forward; a second time a man dressed in scarlet. Cardanus himself could see nothing more than a disturbance in the water, as if produced by the motes of a sunbeam, and a peculiar generation of bubbles.

The same principle lies at the foundation of *onychomancy*, where the thumb-nail of some suitable person, or the palm of the hand was annointed with oil and soot, and the images appeared in the shining surface illuminated either by the rays of the sun or by a

candle.* Ink was often poured into the palm of the bent hand and divination made from the reflecting surface of the ink.

It will appear from the very enumeration of these multifarious methods of procedure that the effect does not depend upon the especial character or constitution of the "magic mirror." It is a remarkable trait of human thought, however, that it first endeavors to trace all phenomena back to external facts before it seeks the cause of the same within itself: the child of nature sees in all his thoughts the inspirations of good or evil spirits, and even the modern believer finds the source of all extraordinary enlightenment not in himself but in another—the Highest Being. A very high degree of culture is requisite for man approximately to comprehend what marvellous forces slumber within him, and to what a great extent, in the truest sense of the word, he is the creator of his own perceptions and emotions. And thus it was that throughout the long space of three thousand years people did not clearly discover that in the case of magic mirrors the most important factor was the *person that saw*, and not the instruments of seeing. If we will use the word "superstition," therefore, we can justly do so with reference to the improper disposition of the two factors involved.

This incorrect interpretation of the phenomenon, as being necessarily dependent in its origin upon the material object employed, then called forth the fables regarding some particularly rare and miraculous mirror which was kept in a certain family as a holy relic, and whose possession admitted people to a knowledge of the secrets of nature and of the future. Countless sacrifices of money and human life have been made to these extravagant fancies. Indeed, even today, certain English business-houses deal in magic mirrors "manufactured after the best prescripts," and certainly derive much profit from their traffic. In all the treatises upon occult science, in those

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* The facts cited are taken from Karl Kiesewetter's essay *Hypnotisches Hellsehen*, in *Sphinx*, I, 130, 1886. Perty's work on the Magical Phenomena of Human Nature, and Adolf Bastian's treatise *Psychische Beobachtungen bei Naturvölkern* in No. 2 of the *Schriften der Gesellschaft für Experimental-Psychologie* (Leipsic, Ernst Günther, 1890), may also be consulted.

of ancient Egypt as well as in those of the present time,—and the literature of divination by mirrors (catoptromancy) fills whole libraries,—in all I say are found directions for the manufacture of especially effective glass or metal mirrors. True, in addition to this, there is now and then a presentiment to be detected of the importance of personality. Tradition prefers in such experiments chaste maidens, pure boys, or pregnant women—a choice that despite its material faultiness at any rate pursues the correct principle of emphasising individual character.

Mirror-gazing was formerly, and is to-day, most extensively practised in the Orient. We possess an account written by Lane in 1834 of an adventure he had in Egypt in company with the English Consul Salt. The magician in charge of the ceremonies first wrote upon a slip of paper invocations summoning his two Genii; and then a few verses from the Koran, "to open the boy's eyes in a supernatural manner, ... to make his sight pierce into what is to us the invisible world." The slip of paper was thrown into a chafing-dish containing live charcoal, frankincense, coriander seed, and benzoin. A boy eight or nine years of age had been chosen at random from a number who happened to be passing in the street, and the magician, taking hold of his right hand, drew in the palm of it a magic square, that is to say, one square inscribed within another, and in the space between certain Arabic numerals; then, pouring ink in the centre, bade the boy look into it attentively. At first the boy could only see the face of the magician, but proceeding with his inspection, while the other continued to drop written invocations into the chafing-dish, he at length described a man sweeping with a broom, then a scene in which flags and soldiers appeared, and finally when Lane asked that Lord Nelson should be called for, the boy described a man in European clothes of dark blue, who had lost his *left* arm, but added, on looking more intently, "No, it is placed to his breast." Lord Nelson generally had an empty sleeve attached to the breast of his coat, but as it was the *right* arm he had lost, Lane, without saying that he suspected the boy had made a mistake, asked the magician whether the object appeared in the ink as if actually before the eyes, or as if in a glass, which makes the right

appear left. He answered they appeared as in a mirror; and this rendered the divination faultless.

A counterpart to this in more recent times may be cited. When Seringapatam was stormed by General Harris and Sir David Baird, the unfortunate Tippoo Saib retired to discover by means of divination by a cup what the future prospects were for the continuance of his rule. After he had remained seated for a long time deeply absorbed in meditation, he suddenly sprang up and in despair rushed into the foremost ranks of the combatants and fell covered with wounds; so deeply had the fatal aspect of the image in the cup moved him.

In Europe, during the period of classic antiquity, hydromancy was especially practised. The Byzantine Andronicus Comnenus also put his faith concerning the knowledge of future things, in water. Christianity denounced the practice of these magic arts as the work of the devil. St. Thomas Aquinas says that the gift of seeing visions possessed by children, is not to be ascribed to any power of innocence but to evil influences. Despite this however the art did not perish. Indeed, in the sixteenth century, under the protection of physicians and University professors, it attained the acme of its development.

The celebrated humanist Pico de Mirandola was firmly convinced of the power of magic mirrors, and declared that it was sufficient in order to read in a magic mirror the past, the present, and the future, simply to construct one under a favorable constellation and at the proper temperature.

But the most successful of all in the practice of crystallomancy was Dr. Dee, who flourished from 1527 to 1608. His seer or scryer was a man named Kelly, who could hardly be described as "unpolluted" or as "one that had not known sin," for he had been the perpetrator of so many villainies that as a testimony of his character both his ears had been cut off. A crystal served as the vehicle of the ecstatic revelations, to which according to the conception of the times numerous spirits were attached, who made themselves intelligible to Kelly by dramatic scenes and often by sounds. The Shew-Stone, or Holy Stone, was round and rather large; it is said

to have come into Dee's hands in a very wonderful manner. The large folio volume of the English mathematician upon crystallomancy was very probably used later by Cagliostro, although the latter practised a somewhat different method and used a carafe of water instead of the stone. The prophecy of the magician who predicted the regency of the Duke of Orleans through the death of the Prince, is to be noticed as the last historical case of the use of the magic mirror.

In our century Courts and Universities no longer form the stage upon which the drama of crystal-gazing is enacted, but almost exclusively the circles of the Spiritists, or, as they are commonly called, Spiritualists. Spiritualism has artfully confiscated a great quantity of psychological data, and has made an impartial examination of phenomena very difficult by always presenting the data to the novice in connection with spirit-theories. Having learned much from evil experience, the public has assumed a sceptical position with regard to everything that comes from spiritualistic quarters, and easily overlooks what is actual and real beneath the cover of uncritical drivel. I shall also introduce here one or two instances which plainly show that after the stupendous advances which made chemistry an exact science the cause of these phenomena was no longer sought in the properties of stones and mirrors, but was attributed to ghosts and spirits, by which still greater confusion was produced.

In Justinus Kerner's "Magikon" we read: "Questions are put to the unsubstantial beings that appear in shining objects and the seer hears the answer in dull tones. These beings also make signs and often appear in great numbers, but again only three at a time,—and within five or ten minutes in the case of practised scryers, but in the case of the unpractised not until a longer space has elapsed. The objects described appear in a few seconds and vanish when they are no longer needed. In Athens a female seer of this description is said to have seen a sick person in Vienna and everything described in minutest detail was confirmed by the next post. A boy who beheld absent persons and their acts in a medicine glass

filled with water is said to have discovered by this means unknown thieves."

Barth gives the following directions for crystal-gazing: "When the crystal has been ground and polished it is dedicated to some spirit or other; this is called its consecration. Before being used it is 'charged'; that is, an invocation is made to the spirit, wherein a vision is requested of the things that one wishes to experience. Ordinarily a young person is chosen to look into the glass and behold the prayed for vision. After a little time the crystal becomes enveloped in a cloud, and a tiny vision appears which represents in miniature the persons, scenes, and things that are necessary to supply the required information. When the information has been obtained the crystal is 'discharged,' and after receiving thanks for the services he has performed the spirit is dismissed."

Perty from whom I take this citation aptly adds, "One's own spirit, accordingly, is here invoked as a stranger."

The recent reports of Anglo-American Spiritualists are less crude, yet are similarly permeated by ghost-hypotheses. For example, a Mr. Rogers relates that he had put a crystal into the hands of a lady who knew nothing at all of its magical powers, yet who a short time afterwards very minutely described a scene in which a lecturer, evidently of English nationality, was addressing a foreign audience, while behind his chair the shade of a North-American Indian stood—the source of his inspiration. A few months later the lady was by chance introduced to the United States Consul at Trebizond whom she immediately recognised as the principal character of her vision, and who upon being questioned declared that at the time mentioned he had given an address at that place, and moreover, that according to the declaration of Spiritualist mediums he was controlled by the spirit of a North-American Indian.

In Germany the best known work is probably the "Visionen im Wasserglass," by Frau Adelma Von Vay, née Countess Wurmbrand. She reports in her little book some ninety experiments that were made in the years from 1869 to 1875. Frau Von Vay sees her pictures without difficulty, at times in their natural colors, at times in shades between white and black; often they are of only momen-

tary duration, then again they persist for some time or gradually melt into confused and nebulous spots. The lady dictates to her husband the description of what is presented to her gaze; the "Spirit" furnishes commentaries and supplementary interpretations, and the fulfilment or non-fulfilment of the prophecies and divinations is carefully noted down.

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Before passing on from the history of this subject to the presentation of a number of systematic experiments, and to the development of the theory underlying them, I shall briefly consider the part that the magic mirror has played in poetry and fiction. For we often find here, especially in popular poetry, fairy tales, and traditions, an artistic anticipation of ideas that only the advanced knowledge of later centuries is able scientifically to verify. The illumined eye of genius prematurely seizes upon what in the distant future becomes the conscious property of all humanity. And this is true of the half-unconscious art of the individual poet. The imagination of the poet, borne aloft by the immediate sense of truth and the self-consciousness of typical humanity, casts flashes of illumination very frequently into the dark regions of our inner world. In the facts inherent in popular instinct it discovers intuitively a multitude of combinations, long before they possess for the average perception creditable possibility, or even possible reality. The minute analysis, however, of symbolic art belongs to the most difficult problems of comparative psychology.

To present at once from the multitude of examples a singularly striking one, "The History of the Youthful King Zein Alasnam and the Prince of Spirits" may be chosen. Zein Alasnam, who possesses eight statues of great value, is in quest of a ninth of marvellous beauty, which the Prince of Spirits promises him as soon as "thou shalt bring me a young maiden who shall be at least fifteen years of age and of perfect beauty; the maiden shall not be vain of her beauty and shall have never spoken an untruth." With the help of his magic mirror, Zein, after many vain attempts,—for the mirror was always murky when he looked into it in the presence of a girl,—

finally found a maiden in whose presence a brilliant image shone forth from the mirror. By strategy Zein brought the noble girl, with whom in the mean time he had fallen passionately in love, to the Prince of Spirits—but it must be confessed that it was only at the earnest entreaty of his faithful servant, for he would have very much liked to possess the maiden himself. The Prince of Spirits thanked him and told him to return to his home where he would find the ninth statue that was promised him upon a golden pedestal in the centre of the others. Zein hastened to his palace and flew into his treasure-chamber. Upon the ninth pedestal there stood attired in silk of roseate hue, with modest blushing countenance, an immovable statue. Zein Alasnam, dazzled by the brilliancy of the other forms, stepped into the glittering circle to behold his treasure close at hand, when behold! the statue suddenly descended from its pedestal and fell into his arms. It was the same beautiful and virtuous maiden that he had conducted into the presence of the Prince of Spirits. She wept tears of joy and Zein Alasnam wept with her.

The factor here emphasised—namely, a mirror that only exhibits a clear surface to its possessor when a chaste maiden is in its presence—is not at all as fabulous as at first sight appears. It depends of course upon the person gazing whether the reflecting surface will appear murky or not; for it is a question here merely of subjective perception, and not of an objective blurring of the glass. In the case in which the girl made no impression upon the youth,—that is where the soul unconsciously passed an unfavorable judgment,—the picture will have been dimly perceived and will thus have expressed in a strangely roundabout way, that which lay slumbering in the depths of his heart. The mirror furnishes no other information than that which we put into it; but it communicates it to our every-day consciousness which knows little or nothing of the recondite processes of our inner life. The fabulous performances of other magic mirrors may be similarly explained if we discard the unnecessary adornment in which they are generally set forth. The "buch aller verbotenen kunst" (published in 1455), a mediæval collection of stories of this character, is supplied with marginal

annotations of moral purport that possess some historical value. We shall therefore transcribe a passage illustrative of its character.

"Die maister und iregleichen die treiben die kunst pyromancia auch in ainem schlechten spiegel und lassen kinder darein sehen die sie dan auch vast beswern und in auch verporgne wort einraunen und mainent vast vil darin zu erfragen. das ist alles ein ungelaub und des boesen tewfels gespenst und verfuerung. huet dich du christen, ich warn dich gar treulich, auch treibt man die sach in ainem schönen glanzen pulierten swert . . . In der kunst pyromancia sind auch gar vil ander ungelauben, und nemlich ainer der sol des gewiss sein, der ist der allerschnoedest und boesest, wann so man ie vester gelaubt an soelich zauberey so si ie mer is sünd. das stueck gat zu, das die knaben kuenftige und alle ding suellen sehen in ainem cristallen. das stueck treiben die valschen verzweifelten und verzagten cristen, den dann lieber ist des tiuefels gespenst und trugnuss, dan die warheit gottes in maniger hand weis. ettlich haben gar ain lautern schoenen gepulierten cristallen oder parillen, den lassen sie waihen und halten in gar rain und lesen dazu weirrauch, mirren und desgleichen, und wann sie die kunst treiben woellen, so warten si uf gar ainen schoen tag oder haben ain rain gemach und darin gar vil geweichter kerzen; die maister gan den gen bad und nemen dann das rain chind mit in und beclaiden sich dan in raines weiss gewand, und sitzen nider und sprechen in zauber bact, und prennen den ir zauberopfer und lassen dan den knaben in den stain sehen und raunen im in seine oren verporgen wort die suellen vast hailig sein, warlich, die wort sind tewflisch."*

Exactly one hundred years after this, a similar *pot-pourri* appeared, intermingled with references to modern affairs and Christian

* "The Masters and their like also practice the art Pyromancia in a wretched mirror, and make children look into it, whom they then do conjure and also whisper secret words in their ears, and fancy they get much information thereby. But it is all a heresy, the work and allurement of the wicked devil. Christian, have a care! I give thee honest warning. They practise the thing, too, in a beautiful, shining, polished sword. . . . In the art Pyromancia there is also much other heresy, and especially there is one that is so, the worst and wickedest of all: and the firmer one's belief in it is, the greater is his sinfulness. Here, young boys are said to behold future things and all things in a crystal. Base, desperate, and faint-hearted Christians practise it, to whom the shadow and the phantom of the devil are dearer than the truth of God. Some take a clear and beautifully polished crystal or beryl, which they consecrate and keep clean, and treat with incense, myrrh, and the like. And when they propose to practise their art, they wait for a clear day, or select some clean chamber in which are many candles burning; the masters then bathe, and take the pure child into the room with them, and clothe themselves in pure white garments, and sit down and speak in magic sentences, and then burn their magic offering, and make the boy look into the stone, and whisper in his ears secret words, which have, as they ween, some holy import: verily, those words are of the Devil."

Ethics, entitled the "Neupolierte Geschicht-Kunst- und Sittenspiegel ausländischer Völker." Wherein we may read this:

"Es ist bekannt | dass | in manchen Staedten | bey uns | unterweilen alte Weiber | auch wol zu zeiten Männer | den Leuten | welchen GOtt eine Straffe schuldig ist | in Spiegeln und Krystallen weisen | was sie zu wissen begehren. Also hat | fuer einigen Jahren | zu Elbingen in Preussen | einer sich aufgehalten | welcher | aus einem solchen Wahrsager-Spiegel | die Verborgenheiten verkuendiget | und den Fuerwitzigen angedeutet hat. Mit dem Krystall-Gucken | wird zwar mancher | von den alten Sagen-Sprecherinnen | getaeuscht | und falsche Mutmassungen | oder behende Augenblendungen | ihm fuer eine Gewissheit verkauft: weil solche Vetteln vielmals | unter dem Schein der Wahrsager-Kunst | ihren Betrug spielen | und weder Gutes noch Boeses wissen. Nichts destoweniger stehen dennoch auch viel solcher alten Sibyllen mit dem schwarzen Kaspar in guter Vertraulichkeit und koennen | in den Spiegeln | oder Krystallen | durch Huelfe und Vermittelung dieses boesen Geistes | den Erfolg kuenfftiger Begebenheiten fuerbilden. Wie dessen Herr Johannes Rist ein merkliches Exempel erzaehlet welches er | in seiner Jugend | mit seinen leiblichen Augen | gesehen | in einer grossen Stadt: darin er sich damals | bei fuernehmen Leuten | aufgehalten | die einen feinen wohlgearteten Sohn gehabt | welcher nachgehends zu hohen Ehren-Aemtern gestiegen."*

Again, we have a "Denckwuerdige Geschichte von der Krystall-Guckery," which makes skilful use of all the fabulous elements of the magic mirror legends. It tells of a mirror that always reveals to its possessor the truth, and by means of which the future may be divined. A prominent feature of the nursery tales of to-day is discoverable in it—that if children look at night into a mirror an

*"It is known that in many of our towns old women, possibly at times men, sojourn, who show to people to whom God owes punishment that which they want to know, by means of mirrors and crystals. Some years ago one such person was staying in Elbingen, in Prussia, who predicted hidden truths by the help of a divining mirror of this kind, and announced them to his curious customers. Many indeed are deceived in crystal-seeing by the old fortune-tellers that practice it, and baseless guesses and cunning deceptions of the eye are often sold them for certainties: for these hags frequently practise their impostures only under the cover and semblance of the art of divination, knowing neither good nor bad. Nevertheless, many of these old Sibyls stand upon terms of intimacy with Black Kaspar, and are able with the assistance and intermediation of this evil spirit to foreshow in their mirrors and crystals the issue and outcome of future events. Such was the remarkable case that Herr Johannes Rist tells of, which he saw in his youth with his own corporeal eyes; it was in a great city wherein at the time he was staying with very distinguished people who had a handsome and well-mannered son who afterwards rose to high offices of honor."

ugly, forbidding face will gaze out upon them. The book, however, presents few interesting details, and we may therefore pass it and others of the same period by in order to hasten on to the present.

And to whom would not the name of Hoffmann at once occur! He who delighted to employ, and weave in the magic web of his fiction, all that was marvellous and mysterious, will undoubtedly have dealt with the subject we now have in hand. In fact the magic mirror has three times figured in his works: once in "Der Goldene Topf," again in the "Lebensansichten des Kater Murr," and finally in the novel "Das öde Haus." A few passages may be taken from the last-mentioned novel as illustrations of the point we are considering.

A small forsaken cottage bears an evil name; it hides a secret from the world.

"This was what people said in the town, and I who tell this story could get no rest with thinking of it; daily I walked by the house with the curtained windows. Once, as I was passing, I saw the curtain move and a beautifully-shaped hand adorned with a brilliant diamond ring place a crystal carafe upon the window-sill. The memory of this picture aroused in my mind a visionary dream, and on the following day when I looked up to the window at which the hand had appeared, the countenance of the vision I had seen was regarding me with a look of sorrowful entreaty. I seated myself upon a bench opposite, the back of which was turned to the house, so that by leaning over the arm I could gaze without disturbance at the fatal window and the lovely maiden. Absorbed in contemplation, I failed to observe an Italian pedlar who was offering me his wares. But being seized by the arm I at last gave attention to the importunities of the pedlar, who, with the words 'I have other beautiful things here,' pulled out the lower drawer of his box, and held at a short distance before me, at an angle, a little round pocket-mirror that lay in the drawer among a number of other trinkets. I beheld the desolate house behind me, the window, and, marked in the distinctest outlines, the lovely angelic form of my vision. I quickly purchased the little glass, which now made it possible for me, in easy posture and without attracting the attention of the neighbors, to look towards the window of my hopes. . . . The little mirror that so deceptively reflected the lovely form, I had now devoted to domestic purposes. I was in the habit of tying my cravat before it. And so it happened once, while I was in the act of performing this important duty, that it appeared tarnished to me. With a view to brightly polishing it, I breathed upon it in the usual manner. My pulse ceased its beating, my heart trembled with delight and dismay. Delight and dismay! Yes, thus I must

describe the emotion that overpowered me, as, when my breath fell upon the mirror, I beheld in a bluish mist the lovely face that had looked upon me with that sorrowful, heart-penetrating glance!—You laugh?—Denounce me, believe me an incurable dreamer! But say and think what you will—it is enough—the fair one gazed upon me from the mirror, and as soon as the breath disappeared her face vanished in the darkness of the glass.

"But I will not weary you, I will not tell all that came of this. Only this much will I say, that I again and again renewed my experiments with the mirror, that I was often successful in calling forth by my breath the picture I so loved, but that oftentimes my most strenuous efforts were in vain. . . . I lived only in the thought of her; all else was dead to me; I neglected my friends and my studies. . . . Often when that picture grew pale and wan, a physical indisposition seized me, the figure came forth as never before with such life-like reality and brilliancy that I almost fancied I could seize it. And then it seemed to my horror that I myself was the figure, veiled and encompassed by the mists of the glass. A sharp pain in my breast and then total apathy terminated this torturing condition, which invariably left me exhausted, and shaken to my inmost core. In these moments every attempt with the mirror miscarried; but when I had become strengthened, and the picture appeared again from the mirror in life-like form, I cannot indeed deny that a peculiar physical charm otherwise foreign to me was united with it. . . ."

We see what brilliantly colored creations tradition and fiction have woven about the magic mirror. It is now the duty of science to cull from these shining husks, by sober investigation, the kernels of truth; and that, it will be seen, can be done only by experiment. Unfortunately I myself am unable to report any successful experiments; for, despite repeated attempts, I have been unsuccessful in obtaining any images whatever from mirrors, or crystals, or reflecting surfaces of any kind. Similarly several members of the Berlin Society of Experimental Psychology have only had exclusively negative results to recount. But on the other hand, a member of the English Society for Psychical Research has been enabled to report a great number of pertinent observations. And although to my regret I am not permitted to publish the name of the lady* in question, yet every doubt as to the truth of her utterances is excluded, and the material she has furnished forms a valuable enrichment of psychological literature. I shall, accordingly, collect from the com-

* I afterwards received permission to publish her name: it is Miss A. Goodrich of London.

munications of this lady, who is a friend of Professor and Mrs. Henry Sidgwick, several cases which appear to me especially adapted to throw light upon the nature of the strange phenomena we are examining.

The lady made more than seventy experiments of her own, of which—a fact of the greatest value for passing upon their exactness—she always made notes at once, or at the most never more than an hour afterwards. She employed various means for the production of the hallucinations. At first she used the colored balls that are hung upon Christmas trees, or the back of a gold watch; but it turned out that both these objects tried the eyes by their strong brilliancy and grotesquely distorted the visions that were evoked. A glass filled with water proved to be inconvenient to handle, especially in the dark; while mirrors also possessed many disturbing peculiarities. A magnifying glass set on a dark background proved to be very effective, especially by daylight; as did also a black-framed photograph placed upon the wall of the room opposite the light. The gaze and the attention, however, were best concentrated upon a well-polished rock-crystal. The method of procedure—since happily all the appurtenances of mysticism were discarded—was very simple. The lady draped the crystal in black, placed it where none of the surrounding objects could be reflected in it, and waited for whatever might happen.

What occurred? The simplest instance is perhaps No. 7, which we here introduce:

"I find in the Crystal a bit of dark wall, covered with white jessamine, and I ask myself, 'Where have I walked to-day?' I have no recollection of such a sight, not a common one in the London streets, but to-morrow I will repeat my walk of this morning, with a careful regard for creeper-covered walls. To-morrow solves the mystery. I find the very spot, and the sight brings with it the further recollection that at the moment we passed this spot I was engaged in absorbing conversation with my companion, and my voluntary attention was preoccupied."

This is a very simple case. A visual image, recently yet unconsciously received, springs up from the subterranean strata of the soul into which it had sunk. No. 68 affords a similar instance:

"I had carelessly destroyed a letter without preserving the address of my correspondent. I knew the county, and searching in a map, recognised the name of

the town, one unfamiliar to me, but which I was sure I should know when I saw it. But I had no clue to the name of the house or street, till at last it struck me to test the value of the crystal as a means of recalling forgotten knowledge. A very short inspection supplied me with 'Hibbs House' in grey letters on a white ground, and having nothing better to suggest from any other source, I risked posting my letter to the address so strangely supplied.

"A day or two brought me an answer, headed 'Hibbs House' in grey letters on a white ground."

Tricks of the memory like these appear still more strange when they are due merely to an indirect excitation. It may happen that one is suddenly reminded of a friend who is long since dead, by the accidental sight of his favorite dish. No direct excitation is here presented, but the image of the friend remembered is indirectly revived through a certain concatenation of ideas. This we find in the eleventh experiment:

"One of my earliest experiences was of a picture, perplexing and wholly unexpected—a quaint oak chair, an old hand, a worn black coat-sleeve resting on the arm of the chair,—slowly recognised as a recollection of a room in a country vicarage, which I had not entered and but seldom recalled since I was a child of ten. But whence came this vision, what association has conjured up this picture? What have I done to-day? . . . At length the clue is found. I have to-day been reading Dante, first enjoyed with the help of our dear old vicar many a year ago."

The process here carried on, which takes place for the most part outside of the sphere of consciousness, is therefore the following: The reading of Dante revives the image 'Vicar'; the image 'Vicar' produces the image of the room; the latter image is externalised.

But we can penetrate *consciously* into these processes. There are any number of people who, with their eyes closed, can produce phantasy-pictures surprisingly realistic; and geniuses especially have command of rich powers in this direction. George Sand's biographer tells us, that sitting at the feet of her mother before the chimney fire, she would often watch the old green-colored fire-guard in order to form from the reflections of the flames figures and scenes. And this is the case of our English lady. Just as an imaginative child tells itself stories, so she, to while away the time, builds in the twilight hours groups of figures, and projects them into her crystals; and so strange is the unconscious "I" to the conscious "I," that oft-

entimes the miniature drama that is unfolded is the source of the greatest surprises to its own creator. This independence of our consciousness in two spheres, is exhibited with surprising distinctness where especial aids and expedients must be employed to decipher the visions. Thus :

"On March 20th, I happened to want the date of Ptolemy Philadelphus, which I could not recall, though feeling sure that I knew it, and that I associated it with some event of importance. When looking in the Crystal some hours later, I found a picture of an old man with long white hair and beard, dressed like a Lyceum Shylock, and busy writing in a large book with tarnished massive clasps. I wondered much who he was, and what he could possibly be doing, and thought it a good opportunity of carrying out a suggestion which had been made to me, of examining objects in the Crystal with a magnifying glass. The glass revealed to me that my old gentleman was writing in Greek, though the lines faded away as I looked, all but the characters he had last traced, the Latin numerals LXX. Then it flashed into my mind, that he was one of the Jewish Elders at work on the Septuagint, and that its date, 277 B. C., would serve equally well for Ptolemy Philadelphus! It may be worth while to add, though the fact was not in my conscious memory at the moment, that I had once learnt a chronology on a mnemonic system which substituted letters for figures, and that the memoria technica for this date was 'Now Jewish Elders indite a Greek copy.'" (No. 74.)

The employment of a magnifying glass, which by reason of external difficulties is seldom possible, is a convincing proof of the degree of independence of the two personalities within us. Anything more marvellous than the fact before us can hardly be imagined. We create something which is immediately wrested from our control and which leads a totally independent life ; we produce something which becomes for our own selves a mute enigma, and which can only be aroused by artificial means out of its ghost-like silence.

"The rent that gapes throughout creation,
Goes also through the human heart."

And thus it may happen that our second "I" actually mystifies at times our first and principal "I."

Once a number of letters appeared to her in the crystal, each letter seen separately, of a bright red color. At first they seemed to be absolutely meaningless, but it was at length discovered that they composed words, spelt backwards, in the following fashion :—

d e t n a w a e n o e m o s o t n i o j a e t a v i r p e l c r
i c t s u m e b g n i l l i w o t e v i g s e v l e s m e h t p
u o t e h t t c e j b u s

and the message at length became intelligible as follows :—

"Wanted a someone to join a private circle, must be willing to give themselves up to the subject."

We now come to a third group of experiments in which an entirely new element enters into play. Whereas hitherto we have seen things revealed in the magic mirror which were demonstrably or presumably already present in the brain of the operator, or, where this was not the case, in any event possessed no external significance, we now hear of experiments in which unknown events are said to have been presented. I should take no notice whatever of this class of reports regarding clairvoyance in space and time, if our informant did not give the impression of being thoroughly conscientious and scientific. The English lady possesses, as I believe I have discerned from our correspondence, a highly critical mind, and is well acquainted with the common sources of error in this department of investigation, and her testimony is in my opinion more valuable than that of all the early authors together. It were indeed more acceptable if the results of recent investigations had been to show that all the phenomena of crystallomancy were referable to the hitherto misunderstood dominance of the soul of the individual gazing; but since a number of cases remain that will not fit into this explanation, we must as honest people openly acknowledge the fact. Accordingly, without attempting any detailed explanation, I shall select a few cases as illustrations, leaving it to the reader to discard them as "accidental" or to retain them as worthy of consideration:

"On Saturday, March 9th, I had written a somewhat impatient note to a friend, accusing her of having, on her return from a two months' absence on the Continent, spent ten days in London without paying me a visit. I was not, therefore, surprised, when on Sunday evening she appeared before me in the Crystal, but could not understand why she should hold up, with an air of deprecation, what appeared to be a music portfolio. On Monday I received an answer, written the previous day, pleading guilty to my charge, but urging, in excuse, that she was attending the Royal Academy of Music, and was engaged there during the greater

part of every day. This intelligence was to the last degree unexpected, for my friend is a married woman, who has never studied music in any but amateur style, and who, according to the standard of most ladies of fashion, had "finished her education" some years ago. I have since ascertained that she, in fact, carries a portfolio corresponding with the sketch I made of that seen in the vision." (No. 64.)

The simplest explanation of this case would be the assumption that our informant had at some time or other cursorily heard of her friend having again taken up music. The whole thing would then be a revived memory; and the agreement in appearance of the portfolio seen with the real portfolio, an accidental coincidence. But this presumption being excluded, psychologists who believe in the possibility of telepathic communication might propose a different explanation. In this way. The lady's friend, in writing her note of excuse, is vividly thinking of her work, which is to her to a certain extent represented by her portfolio, and conveys this picture to the receptive sub-consciousness of the other lady. There the image lies latent until it is translated into sensory life through the agency of the magic mirror—the very process with which we have at a previous place become acquainted, and will more exactly explain further on. The question, therefore, is reduced simply to the truth of the premise first assumed—namely, telepathic communication; and all that we can at present say, is, that it is considered as an actual fact, upon the basis of personal experience, by many prominent investigators, but is rejected by the majority as undemonstrated. For our part, we admit that an hypothesis of this kind would prove to be very useful, since reports similar to the last mentioned one, have recently been published in great numbers. We select as an illustration the following note by Mrs. L. M., from the Proceedings of the American Society for Psychical Research:

"I was anxious to see a Mr. H., but was uncertain on what day he would call. On the 19th [July, 1887] I was called out of the office, and, before going out, I put on the door a card having these words on it, 'Will return soon.' I was absent about an hour. On my return I came upstairs, but did not ask the elevator boy if any one had called; nor did he tell me any one had done so. As I came within a short distance of the door, I saw some characters written upon the card I had left, and just below the printed words 'Will return soon,' I stooped down and read, 'Mr.

H. has been here, and will return.' As I looked the words faded away. I entered the office, and in a very short time Mr. H. came in. He had left no name or message. He had impressed my face upon his mind very strongly, with the intention of seeing if I would be in any way affected by it, or conscious of his approach."

If the fact of accident, intensified by the strained expectation of Mrs. M., cannot be accepted as a satisfactory explanation, it is to be considered that the white surface of the card in this case acted in the same externalising manner as the crystal in the instance given just above. The remotely-operative excitation penetrated the soul unobserved, and was first translated into a conscious image at the moment when the glance at the card favored the formation of hallucinations.

Finally a number of other cases are to be mentioned, in which even these suppositions seem insufficient; and for the reason that the events seen were not to happen until some future time. But that which has not yet happened, and which is not to be foreseen in detail, can neither originate in the repositories of memory, nor from the telepathic influence exercised by another person. We should in that case be obliged to accept some hypothesis of clairvoyance in time—*granting of course that all sources of error are excluded.* The reader may judge for himself:

"In January last I saw in the Crystal the figure of a man crouching at a small window, and looking into the room from the outside. I could not see his features, which appeared to be muffled, but the Crystal was particularly dark that evening, and the picture being an unpleasant one, I did not persevere. I concluded the vision to be a result of a discussion in my presence of the many stories of burglary with which the newspapers had lately abounded, and reflected with a passing satisfaction, that the only windows in the house divided into four panes as were those of the Crystal-picture, were in the front attic and almost inaccessible. Three days later a fire broke out in that very room, which had to be entered from outside through the window, the face of the fireman being covered with a wet cloth, as a protection from the smoke which rendered access through the door impossible." (No. 36.)

Is this a case of prevision? Granting that the agreement of the facts with the vision is not due to mere accident, the possibility yet remains of a falsification of memory; that is, the possibility that a vision originally *similar* to the event afterwards observed, was

subsequently taken to be the *same* as that event. Such obscurations and falsifications of memory are very frequent. Indeed they get to be epidemic, the moment a second factor, that of *expectation*, is added. We need only have a foreboding that something will eventually happen, and we shall inevitably form certain indefinite notions of its particular character. If now the event actually happens, our obliging memory is at once at hand with the lie, '*Exactly* as I knew before.' 'I told you so,' is the assertion. And it is therefore no accident that in the literature of clairvoyance, the arrival of letters of this or that tenor plays so great a part; for expectation has a broad and acceptable arena in this very connection. The extent to which the falsification of memory and intense expectation take part in the observation which we shall now cite, it would be hardly possible to determine accurately:

"On the evening of March 11th, being tired, I was about to go early to my room, when it occurred to me to wait for the last post, already late, that I might not be again disturbed by having the letters brought to my room. I took up the Crystal rather to pass the time than with much expectation of seeing anything; for as a rule, when one is tired, the concentration of attention necessary to Crystal-vision is somewhat difficult to attain. However, I perceived a white object on a dark ground, soon becoming more clearly defined as a letter in a very large envelope torn at the edges, as if not sufficiently strong to hold its contents. Another envelope, of ordinary size, lying at the top, concealed the address, and the writing on the smaller one was too much blurred to decipher. The vision was momentary only, or I might have applied the test of the magnifying glass, which is sometimes, though not always, of use in such cases. I thought it possible that the vision might be merely the result of expectation, but it seemed at least worth while, after making a note of the fact,—my invariable rule whenever possible,—to test its significance. As a matter of fact, the letters were lying on a seat in the hall, showing white against the dark polished wood—placed there possibly by some one leaving the house who had met the postman before he had time to ring. The letters were two,—the lower one, which had burst the envelope, was the size of a sheet of letter-paper not folded, and was for myself, the upper one, the usual size of a note, and not for me, which may have accounted for my inability to read the address." (No. 66.)

I repeat it—with accounts of this character, though in the highest degree acceptable, science cannot at present deal; and in proceeding now to attempt an explanation of the phenomena illustrated by the experiments of the English communication mentioned,

I shall entirely leave out of consideration the cases that point to telepathic causes or clairvoyance in time and space.

We have already made the acquaintance of some few theories which have arisen historically. Formerly, and even at the present day in fact, certain objects and qualities of objects were made accountable for the occurrence of striking hallucinations. The great cycle of legends that adhere to the magic mirror, has thus arisen. Often a pentahedronal quartz-crystal, often the fusion of the seven ancient metals into polished surfaces was supposed to possess especial virtue. Gregory, of Edinburgh, asserted that the phenomena were most easily produced by looking into a double-convex plate of zinc into the centre of which a small polished copper disk had been set. We now know that in the importance attached to these and similar directions the salient point was missed and an incidental factor pushed into the foreground. But in any event it is worthy of remark, that through belief in notions of this kind the seer gained a greater confidence in the success of his experiments. Even incorrect theories prove to be useful. When any one finally came into the possession of a famous magic stone, his firm belief in its powers induced a disposition to visions that perhaps never before existed in his organism to the same degree.

A second hypothesis regards the phenomena as manifestations of the Devil or the work of spirits. Dr. Dee gives a very minute description of his regular spirit visitors. He tells of an old woman in a red petticoat, and of a pretty little girl with her hair rolled up in front and hanging down very long behind. This constant personification is very significant, since it indicates the approach of recognised forms of mental alienation; however, the "Daimon" of Socrates proves that it does not in every case necessarily lead to this. We are come, here, into a border-land, from which some roads lead into the dark regions of insanity and others up to the luminous heights of inspired genius: but in every case we are concerned with a region in *our own* mind, and no natural propensity to externalisation must be allowed to deceive us with regard to it. The intrusion of foreign "spirits" into our psycho-physical organism, the assumption that incorporeal beings influence our nervous

system so as to produce external effects, violently contradicts all human experience. If the spiritist doctrine could be mathematically proved it would be the most interesting solution imaginable of all these problems; and I must confess, the establishment of the existence of intelligent incorporeal beings would in my opinion eclipse all other events of our time. But the probability of this is at present *very* small.

A third theory, of modern origin, seeks the explanation of the question in a species of magic power inherent in man, as yet unfathomed, which is manifested especially in ecstatic conditions. The vehicles of the *magic gaze* are shining mirrors or reflecting surfaces, which forming a means of attraction for individuals of the proper constitution induce that peculiar state of alienation from every other subject, that concentration in the innermost self, which often rises to insensibility and unconsciousness, or even to cataleptic torpidity, wherein the consciousness of All-existence is liberated. Future events and distant occurrences are seen in pictures which appear to be reflected in the mirror or the fluid employed, but which in reality exist in the person gazing and are represented by projection outwards. Thus Perty.

Other philosophers speak of the "transcendental" capacities and powers of the human soul, or of the liberation of a metaphysical essentiality within us.

But these theories and suppositions are plainly the outcome of a premature simplification of our difficult problem. People are always too ready to thrust forward a new "power" or "force" to unify with dispatch and celerity uncomfortable phenomena of the present sort, and overlook the fact that every single phenomenon demands an exact investigation and explanation. Nothing is accomplished by calling phenomena "magical" or "transcendental." The work demanded is, to ascertain the connection and relation of the phenomena in question with the province of soul-life as a whole. To put an x in the place of a y contributes nothing to the solution of a problem. We cannot be too closely upon our guard against comprehensive syntheses of this character; for their splendid appearance dazzles woefully the eye of research.

Much nearer the truth is the position that hypnosis merely is concerned here. A well-known author, Louis Maury, who wrote in the middle part of this century, says:

"Among the principal methods of divination a great number aim at producing a sort of vertigo by acting upon the eyes and consequently upon the brain, in a manner something like that in which shining bodies act in hypnotism."

Mrs. De Morgan speaks in a similar strain:

"Crystal-vision is a well attested fact, having its laws and conditions like other phenomena in this world of known and hidden causes, and a little careful observation may clear away some of that obscurity which has kept it as the property of witches and sorcerers. The Crystal . . . . seems to produce on the eye of the seer an effect exactly like what would ensue under the fingers of a powerful mesmeriser. The person who looks at it often becomes sleepy. Sometimes the eyes close. At other times tears flow."

Mrs. De Morgan's very description renders it doubtful whether we have to deal here with true, developed hypnotism. Other accounts are also calculated to shake this assumption. Cahagnet, for example, required only a moment of mental concentration for his eyes to become fixed; he lost all sight of the objects he had a moment before gazed upon, and those which he wished to call up appeared between him and the former. All spontaneous visions were fulfilled. When voluntarily evoked, but seven out of ten were true. When he wanted to produce the visions he fixed his eyes upon the first fit object, and he often saw hundreds and thousands of persons running hither and thither in one little shining point. Or he beheld a great city distinctly drawn in a mirror but one inch in diameter. This is not very easily reconciled with our conceptions of the character of hypnotism. Nor less so—to close our list of examples—the observations of an experimenter mentioned by Mrs. De Morgan, that the perceptions of crystal-vision are not interfered with by those of normal vision, but that the percipient could discontinue her observation at will, and returning would find the scene as she left it.

There is evidently involved here the condition of mind called "temporary" or "momentary" hypnosis, or what Eduard Von

Hartmann more aptly calls "masked somnambulism." It is not fully developed hypnosis, but simply its incipient forms—hypnoid states of manifold variations. Now the question arises, Of what do these states consist? What are their essential characteristics? And how are they to be psychologically explained? For even our appeal to hypnotism simply puts a new empty name into the place of an old one. If we do not understand hypnosis, its production for the explanation of the magic mirror profits us very little. The task, accordingly, presents itself of referring, in connection with some psychological theory of hypnotism, the well-established facts at our disposal to one and the same cause.

The theory from which I shall proceed in attempting an explanation, has already been frequently touched upon in the course of this article; for certain observations indicated it so clearly that mention of it was not to be avoided. It is the doctrine of the double consciousness of the human soul.* Acts are done in the course even of our every-day life, which presuppose for their origin and execution all the faculties of the soul, yet nevertheless occur without the knowledge of the individual; they require a sort of consciousness and a separate memory beyond the *cognisance* of the normal person. One of the most frequent cases in practical experience is where the thoughts of a person reading aloud wander and become occupied with an entirely different subject; and where despite this aberration the person in question reads correctly with the proper emphasis and expression, turns the leaves, and in short performs acts which without intelligent control are hardly conceivable. An English psychologist, Mr. Barkworth, has acquired such expertness in the practice of this, that during an animated debate he can rapidly and correctly add long columns of figures without having his attention diverted in the least. This points not only to an unconscious intelligence, but—which is of still greater consequence—

* Compare my treatise *Das Doppel-Ich*, the first number of the "Publications of the Society of Experimental Psychology of Berlin," Leipsic 1890, Ernst Günther. I must refer here, moreover, to an acute criticism of my views by Adolf Bentivegni, published as No. 4 of the above-named series, and entitled *Die Hypnose und ihre civilrechtliche Bedeutung*, Leipsic, 1890. The views set forth in the present article will be found in the German magazine *Vom Fels zum Meer*.

to an unconscious memory. Mr. Barkworth must keep two series of figures in his mind in order to obtain from them a third; this latter sum he is again obliged to retain in order to add to it a newly acquired fourth; and so on. The latter chain of memories, let it be remarked, performs its office entirely independently of that upon which the recollection of the debate is constructed; and it may therefore be reasonably maintained that there exists beyond the cognisance of the individual, both consciousness and memory; and if the essential components of the ego are found in these two last-mentioned factors, then every person conceals within himself the germs of a second personality. I designate the two halves of consciousness that thus operate in greater or less independence of each other,—in a figurative sense of course,—as super- and sub-consciousness, and comprehend the whole as the doctrine of double consciousness or the double ego.

The division very clearly appears in the opposition between waking and dreaming. Even when we very accurately remember a dream which we have just had,—which happens very seldom,—we feel the difference of the two states of consciousness with unmistakable distinctness. We have no power over the tricks that phantasy plays with us in our sleep, and in spite of the often present belief that it is all but a dream, yet every power fails us of penetrating into its independent activity. Moreover the images are generally of a very definite signification, since they are merely reproduced from the store-house of impressions that have sunk into the unfathomable depths of our soul. In this way many a dream reveals to us the true character of our Self; in this manner subbasal dream-images exhibit the thoughts and emotions that principally occupy us in our innermost heart. Closer investigation teaches further, that in dreams, states of intoxication, in somnambulistic and epileptic attacks, not only does a consciousness different from the normal consciousness rule, but that also between separate successive periods memory-links of greater or lesser stability are wont to form. But this is most strikingly exhibited in the case of hypnosis. The hypnotic state is nothing more than an artificially produced ascendancy of the secondary or subordinate ego. All its

peculiarities are explainable from this; for psychology endows the dream-consciousness prevailing in this state, with sensibility and suggestibility, the waking consciousness on the other hand with the inhibitory ideas that represent reality. It has established, moreover, that our fully conscious soul-life rests upon an automatically operating substratum of hallucinatory character, in which images, long since forgotten, have their abode. By virtue of these properties the subconsciousness becomes the source of bold and fantastic creations, while the superconsciousness is made the vehicle of our psychic life-work, laboriously sustaining and regulating itself in its relations with the outside world.

To this conception, which explains crystal-visions as a *form of the activity of the subconsciousness*, it will be variously objected, that such a simultaneous coexistence of two divisions of consciousness does not possess the same degree of probability as an alternation of states of consciousness. But how, upon this latter supposition, could the "Hibbs House" case be explained? In this instance, two psychical groups do not alternate, but one operates during the existence of the other.

Further, the propriety in general is questioned of speaking of half-conscious or unconscious ideas and mental processes. It is the opinion of the Göttingen philosopher G. E. Müller, that just as every excitation of the brain immediately occasioned by a sensory stimulus is not competent to produce a sensation, so also all reproduced nervous excitations are not necessarily accompanied by perceptual images. In the cases mentioned, and in many others, there is no reason why groups of true *psychical* states should be admitted, which, in contradistinction to other psychical states, only lack consciousness; on the contrary, we have to deal with simply a series of nervous excitations, which, as distinguished from other excitations, are not accompanied by corresponding states of our consciousness.

This conception of soul-life, which has been of late very favorably received, Hugo Münsterberg has formulated thus—that the psychical phenomenon is to a certain extent the subjective internal aspect of a thus and thus constituted objective physical phenom-

enon. We are to bear in mind that the succession of the physical processes is nowhere interrupted, and that in addition certain of these physical processes, those namely which are carried on with a certain intensity in particular apparatuses of the brain, possess a psychical internal aspect; so that this excitation of the nervous cells is, without losing thereby anything in physical effect, the condition of the appearance of certain sensations in consciousness.

But by the side of the physiological theory legitimately exist as possibilities a psychological one and a psycho-physical one. It is the doctrine of the latter theories that not only are physical vestiges left behind in the cortex of the brain after every perception, but also psychical dispositions to the formation of ideas and images; and that it is possible for images of all kinds to continue to exist without distinctly attaining to consciousness. These theories distinguish between degrees of luminosity in our percepts and images, the three most important degrees of which I have designated as consciousness, subconsciousness, and unconsciousness. There exists a gradation of degrees of consciousness, and the fully-conscious course of mental representation is everywhere conditioned by its connection with the obscured spheres beyond. Our attention surveys but a small area, on the boundary lines of which the altitudes of consciousness decrease, and finally approach the zero point. I say *approach*, for they never reach it. Our experiments with the magic mirror in fact show us how the oldest impressions, and impressions of ridiculous insignificance, after long long years awake as it were from the slumber of the fabled Sleeping Beauty. If our millions of perceptions were to live on in *consciousness* we should no longer have a past, but live in a continuous celestial present; but were the operation of consciousness so limited that it destroyed great numbers of images, the very facts upon which the belief in supernatural powers rests, would lose their only rational explanation. One result of our study of crystal-visions is assuredly this, that we shall have to erase the word "forgotten" with all its derivatives from the dictionary, and at the most employ the phrase "not remembered." With more ardent yearning than ever before will we long for a river of Lethe,

and join with our whole hearts in the cry of Themistocles, "O that some one might teach me the art of forgetting!"

Along with the inner process the outward form of the hallucination still requires a brief explanation. The circumstance, namely, which lends magic-mirror phenomena their salient feature, is the sensory reproduction of the images that have sprung up from the subconsciousness. The subterranean ideas produced do not reach the surface as thoughts, but as pseudo-perceptions. To refer the latter to the place to which they belong, I shall first remind the reader of the well-known after-images which arise when an excitation produced in the sensory organ and in the sensory nerves does not immediately disappear with the cessation of the excitatory action. By gazing at the sun we can at once obtain this effect. But despite the fact that the last-mentioned class of images possesses the full distinctness of real sensations as distinguished from mere memory and imagination images, they still bear no relation to our subject on account of their union with *recently* occurring sensory impressions. Still less do the repetition-sensations in the dark field of vision—as of revolving wheels—belong here; or illusions. There remain accordingly only *hallucinations*, which are withdrawn from all conscious control, and which possess the exact character of sensory perceptions externally awakened, without any object or objective stimulation actually being present in the outer world to correspond to them.

Hallucinations, the production of which are facilitated by the fixation of shining surfaces, do not occur with all persons; and there may be a kernel of truth in the tradition which designates women and children as endowed with especial capacities in this respect. The investigations of Fechner upon the varying vividness of after-images; the statistics of Galton upon hallucinatory phantasms in artists; and the extensive statistical work of the Society for Psychical Research, appear to point to a connection of this character. Miss Goodrich told me that her dreams were few in number and colorless. I must confess that I was surprised at this; but she added that all her recollections of places were accompanied with the vividness of actual sensory impressions. If, for example, she

desires to describe a room in a friend's house, she returns in recollection to the occasion of her last visit; she again occupies the same chair; the carpet at her feet becomes visible, then the furniture nearest her, then the walls and ceiling, until a true picture of the whole room is extended before her mind's eye. Crystal-visions are distinguished from internal visions of this character only by the single circumstance that they are projected outwards to or upon a reflecting point. These visions often consist of a room that Miss Goodrich has lately seen, or a street sign, or of some movement that has startled her, as of a servant letting a plate fall, or of a dog running under a wagon. No consideration that the objects are not before her is of avail; the force of out-rushing memory-formations and the acquired established connection of the elements of soul-life are reduced to the primitive state that obtains in the soul of a child, to whom life is in reality a dream without definite limits. I well remember from the period of my early boyhood, the peculiar sensation of a state flickering between reality and fancy, and I understand the condition of those primitive tribes with whom dreamland and life intermingle in the strangest way; but capacities in this direction have disappeared down to the striking want of a normally developed faculty for colors.

* * *

Summing up then, we may say, that with regard to their *contents* the phenomena produced by the agency of the magic mirror proceed from the realm of subconsciousness; and that with regard to their *form* they belong to the category of hallucinations. Their contents, not regarded as a performance of memory, appear to possess no great value—so grotesque and ordinary are the few ideas brought up from this invisible storehouse. But they often supply us with a deep view into the secrets of character, and inculcate with terrible emphasis the truth that nothing is lost in the realms of the soul, any more than in the external world which is ruled by the law of the conservation of energy. Every thought that ever traversed our brain, every emotion that has ever thrilled our heart, every wish that has ever animated for a fleeting moment our breast—has all been entered in ineffaceable characters in the day-book of our earthly

existence. Would that this knowledge could strengthen our feeling of moral responsibility!

Thus does the expansion of our psychological conceptions not infrequently lead to an enrichment of our notions of morality. But whether we place a higher value upon this aspect last mentioned, or upon the purely scientific object to which we referred at the beginning of our article, or finally upon a factor connected therewith, namely the enlightenment of society—at any rate we must confess that in the much abused "magic mirror" a rich and attractive source of treasures has been opened.

MAX DESSOIR.

HÖFFDING ON THE RELATION OF THE MIND TO THE BODY.

FEW topics are of greater speculative or indeed practical interest than that of the relation of the body to the mind. Rarely has the subject been treated with such perspicuity and at the same time with such candor and avoidance of hasty dogmatism as by Professor Harald Höffding, of Copenhagen, in his "Psychology" (translated into German from the Danish and published in Leipsic, Reisland). A leading American professor of philosophy remarked to me recently that this for its size (the volume contains 452 pages) was the best all-around work on Psychology; and an examination of the section entitled *Seele und Körper* (Mind and Body) certainly gives countenance to the statement.

Professor Höffding does not indeed oppose himself to metaphysical speculation; he believes that the human mind will never consent to being shut out from the task of searching after the ultimate principles of the universe, of which it is a part. But his standpoint in this work is the purely empirical one, as one's standpoint must be in every positive science. Positive science deals with the facts of experience; metaphysics with their ultimate explanation. He regards it as a misfortune to confuse the two, as popular thinking in psychology does; and scientific thinking in this realm is characterised by the effort to avoid the confusion and keep solely to the facts of observation and experience. Accordingly both materialism and spiritualism are excluded from the field—each theory involving a transcending of the realm of experience, i. e., being metaphysical.

There are two subdivisions of the realm of experience according to Professor Höffding,—one coextensive with psychical phenomena, such as feelings, thoughts, and volitions, the other with physical phenomena, i. e., with what moves in space. They may be called respectively inner experience and outer experience. Each must be grasped in its distinct features; and only after doing so can we feel the *problem* involved in the question of their relation to or connection with one another. For it happens that one set of outer experiences stands in an indisputably peculiar relation to the phenomena of consciousness, namely, the set which we describe by the term "body" and, more particularly, by that of "nervous system" or "brain." Much of what we call the physical world stands in relation to consciousness as the thing known to the knower; but a part of the physical world (i. e., the body or brain) seems a part of the knower as well—a body or nervous system of some kind seems an indispensable requirement or at least concomitant of anything like feeling, or thought, or act of volition.

Now, different as the movements of the nervous system, the processes of the brain are from the phenomena of consciousness, there are a number of resemblances between them. Professor Höffding specifies six: (1) As the nervous system is the central, unifying organ of the body, so does consciousness bring together into a unity all the varied phenomena of experience, scattered though they be in time and space. (2) Just as a change is necessary that consciousness may be awakened, (an absence of contrasts tending in the direction of unconsciousness,) so a stimulus is necessary that the nerves may act. (3) A stimulus may produce a commotion in the nervous system out of all proportion to its immediate efficacy, just as a spark may act on a magazine of powder; so a simple sensation may set in motion a whole train of ideas and emotions, owing to the complicated structure and multitudinous inner relations of consciousness. (4) The movements of the body are slow in proportion as they are conscious; now the nerves which appear to be closely related to consciousness act more slowly than those which direct purely physiological (i. e., unconscious) processes. (5) The lower nerve-centres form a system comparatively independent of the

higher ones; corresponding to this is the fact that many bodily processes go on unconsciously and only make us aware of them when the circumstances attending them are particularly favorable or unfavorable. The *consciousness* of the physical state corresponds to the excitation of the higher nerve-centres. Similarly the action of the will has its physiological counterpart; in the struggle between "the flesh and the spirit," the lower nerve-centres with their reflex and involuntary actions correspond to the flesh, the higher centres to the spirit. (6) The construction of the nervous system is similar to the constitution of consciousness; just as consciousness is at once receptive and active, with more or less of intervening reflection or thought, so the nervous system has both sensory and motor organs, with an intervening sphere.

Not only are there these formal resemblances, there is a real connection, according to Professor Höffding, as is shown by the fact that with the evolution of the nervous system go higher and higher forms of consciousness, that irritation on the surface of an organism must be communicated to the brain that conscious sensations may arise, and that when arterial blood fails to reach the brain unconsciousness supervenes. What hypothesis do these facts conduct to us? All of them must be born in mind that any special hypothesis may be legitimated. There are only four possibilities: (1) Either consciousness and the brain, mind and body, act upon one another as two separate things or substances; (2) or the mind is only a form or product of the body; (3) or the body is only a form or product of one or more mental substances; (4) or mind and body, consciousness and the brain, grow and develop as different manifestations of one and the same substance. It must be admitted that the author at this point somewhat deserts the empirical standpoint to which he declared at the outset that he should keep. The *facts* of correspondence or parallelism are all that come within the realm of experience; their *explanation* must be more or less a matter of inference and theoretical construction and involves a departure in the direction of metaphysics. Professor Höffding is aware of this and says that these hypotheses belong to the border-land between positive science and metaphysics. Moreover, he confesses

that any conclusion he may reach will have only a provisional value and may need revision, before it can serve as a final part of a philosophical system. He will, however, follow as closely as possible the leadings of experience, as indeed he says we should do in all metaphysical speculation.

In considering the first hypothesis, (namely, that mind and body act on one another as two things,) Professor Höffding shows that it is inconsistent with the law of the conservation of energy. For, at the point where the nervous process is converted into mental activity, one sum of physical energy would disappear without being replaced by another sum of the same kind. As matter of fact no disappearance of energy takes place on account of the arising of a conscious state. The chain of psychical causation is not broken; its completeness no more suffers than if states of consciousness did not arise at all. Nor on the other hand does consciousness affect the sum of physical energy; it is hardly conceivable that it should even change the *direction* of such energy (the sum supposably remaining constant, as is sometimes held), since to do this it must itself become a physical force. Moreover, if there is a relation of cause and effect between the brain and consciousness it would seem as if an interval of time must elapse between the process in the brain and the rising of the conscious state, a view to which the teachings of physiology lend no likelihood.

The second hypothesis regards matter as the real or actual thing and mind as an effect or form of it. Such materialism is certainly older than the now prevalent doctrine of the interaction of two distinct things. Homer and the earliest Greek philosophers held to it. Similar views prevailed among the early Christian fathers before Augustine. Modern materialists, however, regard the mind, not in the earlier fashion as semi-corporeal, but as a function or form of the corporeal. Yet when we closely consider the matter, we find that to conceive of the function of a bodily organ is simply to conceive of that organ as in activity. As Goethe said, "Function is das Dasein in Thätigkeit gedacht." But a bodily organ in activity is just as much corporeal as one at rest, and anything without corporeal attributes can no more be the function of such

an organ than it can be the organ itself. The conception of function (in the physiological sense) as truly as that of matter implies something that exists in spacial form; while thoughts and feelings are without spacial form.

In dealing with the third hypothesis, (namely, that body is a form or product of mind,) Professor Höffding does not so much criticise it as explain a modified and interesting form in which Lotze held it. It is not, however, the view which he adopts.

To the fourth hypothesis he gives his adhesion. The parallel and proportional relations between consciousness and brain-activity point, according to him, to an underlying identity between the two. One and the same principle, he says, has found its expression in a two-fold form. The physical interaction between the elements of which the nervous system is composed, is an outward form of the inner ideal unity of consciousness. What we immediately experience as thoughts, feelings, volitions, has its physical representation in certain brain-processes, which as such are under the law of the conservation of energy, though this law has no application to the relation between brain-processes *and* consciousness. It is as if one and the same content were expressed in two languages.

This conclusion, however, he repeats, is but an empirical formula and has provisional value only. One substance, he says, acts in both consciousness and the bodily organism, but what kind of a substance is this, and why does it have this twofold form of manifestation? These are questions, he replies, beyond the reach of our knowledge. We can simply make a statement which seems to be required by the facts, namely, that the same thing which lives, grows, and takes on form in the outward world, apprehends itself inwardly as thinking, feeling, and willing. No opinion is thereby ventured as to whether mind or matter is the more original form of existence. By no means is metaphysical speculation upon this question excluded. The hypothesis of identity (for so Professor Höffding terms it) is consistent with philosophical idealism and also with the view that the innermost nature of being is not identical with consciousness. He simply claims for it that it is the most natural conclusion with regard to the relation between two

empirical sciences, physiology and psychology. These sciences, according to the hypothesis, treat of the same material viewed from two different sides, and there can be no more conflict between them than between one person who looks on the convex side of a circle and another who looks on the concave side (to borrow an illustration used by Fechner).

On another occasion I may give my own views, and content myself now with saying that I have followed with the greatest interest and with much (if not unlimited) satisfaction the treatment of the subject at the hands of the genial, large-minded Danish professor.

W. M. SALTER.

LITERARY CORRESPONDENCE.

FRANCE.

THE work of M. FOUILLÉE which I announced in my last communication (to your other magazine), bears the title of *L'Evolutionnisme des Idées-Forces.* It is a voluminous work; and it contains a great many things—perhaps too many. We have from M. Fouillée, the promise of a constructive work—*La Psychologie des Idées-Forces*, in two volumes; but his present book is chiefly devoted to the labor of demolition. As contemporaneous psychology has its weak sides, and as M. Fouillée is a skilful critic, you may imagine that his attacks upon Wundt, Herbert Spencer, Taine, Ribot, W. James, and numbers of others, both living and dead, are conducted with spirit. The successful fulfilment of the task he has set himself would necessitate the ruin of the hypothesis, avowed or concealed, that has supported psychological research as well as furnished occasional excellent conclusions; for it is the aim of M. Fouillée to overthrow what he has ingeniously termed the theory of "idea-reflexes," and the place once cleared, to substitute for it the theory of "idea-forces."

The chief feature of the book is therefore M. Fouillée's criticisms of the theories "that make consciousness the intermittent illumination of a mechanism"; of the theories "that reduce the sentiments and the emotions to simple reverberations of organic movements and even of expressive movements"; of those finally "that make of desire and the feeling of effort, simple passive muscular sensations, the reflexions of movements already executed." Solid

objections are not wanting in these pages. M. Fouillée does not refrain from playing when he has a good hand.

So far so good. But—we ask—would psychology have ever made any advances if it lacked the hypothesis that M. Fouillée condemns? And, as a matter of fact, are the majority of psychologists really thus irretrievably bent upon establishing a mechanical explanation of life, a theory of "man as automaton"? The truth of the matter is that the opposed point of view has rendered no results, and that in taking consciousness for our central position we too easily go astray in fanciful speculations. On the other hand, by the endeavor to grasp the bonds of mind through the medium of the body, it *has* been found possible to throw some light upon unobserved facts. It would not do to let this be too quickly forgotten; and if some have seen fit to pass beyond and to attempt to reduce the Universe to a mechanism, imprudent saltations of this character into open materialistic metaphysics concern them alone.

Will M. Fouillée be more fortunate in his reduction of the world to idealism? It yet appears doubtful. The definition of 'idea-forces' presents at the outset elements of embarrassment. That every idea, every mental image, however absolutely an image it may be, of emotions or of passions, always contains some motor elements, and consequently acts like a force, is easily comprehended, and every body allows it. When physiologists speak of the power of ideas, they mean nothing else. But beyond that we cannot go. The idea, in M. Fouillée's sense, is every state of consciousness. Now, all the facts of consciousness are reducible to the following elementary connected process: sensation, perceptual excitation, reaction; and the three factors of this process cannot be separated or reduced to one. Every idea, or state of consciousness, is accordingly the source of motion since it contains desire. Desire is basal to the nervous act; the nervous act does not precede and does not explain the higher states that psychologists, viewing things from a different point of view, have regarded as epiphenomena. The essence, not only of man, but also of the world, is desire. The idea-force, "the abridged formula of the appetitive

process," becomes the shaper of universal evolution, and, in a word, the physical is a reflection of the psychical.

Such are, if I am not deceived, the chief propositions of the work, put into a logical form, from which no doubt you will judge that the facts do not correspond without evident hiatus.

You do not believe in absolute truth, and I no more hope for it. The mind does not escape certain illusions, which come from what it necessarily places in the reality that it wishes to know, or which it acquires from itself. Meanwhile both the opposing doctrines triumph, seeing that there is always something in each that cannot be explained; but let them not be too severe on each other, and not forget that if they succeed in explaining something, it is perhaps as well that they resign themselves to not explaining everything.

I had intended to give in this letter a detail of the theory of Mme. CLÉMENCE ROYER, in order to compare it with that of M. Fouillée; I had prepared it from certain published memoirs, as her great manuscript work has unfortunately not found a publisher. But *The Open Court* has given a résumé of it sufficiently complete to excuse me from returning to the subject. Whatever service can be rendered by the hypothesis of Mme. Clémence Royer, or, more strictly whatever use can be made of the mathematical formulæ which explain them, or which are deducible from them, it will belong to special scientists to inform us. She begins the explanation of the world by physics, and M. Fouillée by psychology. It is a difference in the point of departure. Let us add that M. Fouillée appears to imagine an activity without substance, a mind without muscles, if it can be thus expressed; on the contrary, in that which she calls world-stuff Mme. Clémence Royer distinguishes a hyperethereal or vital state, and she assigns for the substratum of life this simple state of the cosmical substance.

Opposed as may be the character of the minds of these two authors, the two theories seem to coincide in the notion of a living and conscious monad. We meet it when they are farthest apart! Thus, for Mme. Clémence Royer, life and consciousness are everywhere, they are in the atom, and from the beginning. There, in the great "romance of being," is a scene which reappears almost

always the same. As to the ultimate explanation we have no great choice, and each of the hypotheses that we form almost produces the other. All the value of a system of philosophy is really in the help it lends to scientific curiosity or to the conduct of life.

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M. ERNEST NAVILLE is one of those who cannot comprehend moral conduct in life apart from spiritualism. He endeavors, accordingly, in a work called *La Physique Moderne*, to prove that the study of the phenomena of matter does not imply materialism and does not necessarily lead to atheism. The argument of M. Naville is well worn. We shall grant to him only that "it is necessary to avoid implicitly solving questions by saying that we do not deal with them at all." On the whole, this pledges to nothing. Practically, and in good faith, abstention is nevertheless a solution.

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I have now to point out *L' Esthétique d' Aristote et de ses Successeurs*, by M. CH. BENARD, an *Etude sur Francois Bacon* by M. J. BARTHELEMY ST. HILAIRE, and *L' Anthropologie Criminelle et ses Récents Progrès*, by M. CESARE LOMBROSO. M. Bénard is one of the good old masters, who, what they do know, know well, and his book is one of those that it is profitable to possess. The study of M. Barthélemy St. Hilaire is followed by the Report on the Memoirs presented to the Academy of Moral and Political Sciences, which had proposed as a subject "The Philosophy of Bacon." As to M. Lombroso, the celebrated Italian criminologist, he has wished to reply to the objections that have been made to his views, especially by the French medical alienists at the Congress of 1889, and this is why he has written on this occasion in our language: he supports by new facts the notion, hitherto contested, of a "criminal type."

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The last work of which I have to speak, is the *Souvenirs de M. Charles Mismer*,* of which the third volume which recently appeared, has for its title *Souvenirs de la Martinique et du Mexique pen-*

*In course of publication by Hachette. The other works mentioned are published by Alcan.

dant l'Intervention Francaise. There is in these volumes no express philosophy, as this term is understood, but they are the work of an observing, reflecting mind, and in these pages one sees a man living and growing. In the course of his adventurous existence, M. Mismer, already instructed by experience, by chance acquired knowledge of the *Cours* of August Comte; he became attached to it, and found there an opening into sociology, a tie by which to link together his personal ideas. He afterwards published several articles* in the Review conducted by M. Littré, and he records to-day in his *Souvenirs* the valuable observations which he has had occasion to make on very different races of men and strongly opposed social states. He is one of those whom the philosophic spirit has led to a philosophic life, and the persons who read his work will thank me for having made them acquainted with a unique and worthy character.

LUCIEN ARREAT.

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* A part of these articles formed a volume entitled *Principes Sociologiques.*

BOOK REVIEWS.

THE WAY OUT OF AGNOSTICISM, or, THE PHILOSOPHY OF FREE RELIGION. By *Francis Ellingwood Abbott*, Ph. D., Boston: Little, Brown & Co.

"This book aims to show that, in order to refute agnosticism and establish en-"lightened theism, nothing is now necessary but to philosophise that very scientific "method which agnosticism barbarously misunderstands and misuses . . . It aims to "develop the philosophy which must (consciously or unconsciously) underlie any "and every free religious movement or institution: namely the philosophy which "results from the faithful application of the scientific method to the universe as a "whole."

The author further observes that "nothing is more common or more confusing than a loose vague and indeterminate use of this phrase" [scientific method] and that his object is "to give definiteness and scientific precision to a much abused expression by showing that the Scientific Method . . . is neither more nor less than the SCIENTIFIC THEORY OF UNIVERSALS APPLIED IN PRACTICE TO THE ACQUISITION OF KNOWLEDGE."

Now whether or not the identification of the scientific method with the practical application of the theory mentioned, will give the much needed definiteness and precision, depends very much upon the definiteness and precision of that theory itself.

The Scientific Theory of Universals, the author tells us, receives "no adequate exposition" in this book. We are in possession, however, of several other publications of the author, one of which—"Scientific Theism"—is largely devoted to that purpose.

We will endeavor in a spirit of studious candor and fidelity, to state as well as we can the essentials of that theory. We must protest, however, that we cannot undertake to clear up the obscurity that must necessarily involve any theory that is stated by the aid of such shifty and inconstant terms, as objective, subjective, knowledge, relation, existence, reality, etc., when the same are used without rigorous definitions of the respective senses thereof that are intended.

The Scientific Theory of Universals affirms, that objectively real individuals do exist, that objectively real genera do exist, that objectively real relations do exist, that the objectively real genera are in every instance constituted as such by that

set of objectively real relations uniquely appropriate to it; that in every instance of a genus the objectively real relations "reproduce" themselves *in specie* in the mind separate from aught of the objective realities that are brought into relation by them, that these "reproduced" relations in the mind constitute the subjective concept that is designated by the word appropriate thereto, and that the single objective Universal is *at once* and integrally the objective genus, the subjective concept, and the term or word. The Universe is the *summum genus*, concept and word, which is, means, and expresses the correlated totality of all genera together.

Dr. Abbott neglects reference to genera of purely mental existences, and relies for proof of his theory upon the single argument that no postulate is used that Science has not taken for granted, and proved by the finding that the facts are in agreement with the postulates.

Now "the only possible justification of any theory is that it makes things clear and reasonable." In this theory the central and controlling position is that the objectively real relations invade the mind in person and there obtain as the concept.—This doctrine is so far as we can see the original idea of Dr. Abbott and must be considered as his contribution to philosophy. It is by this that his work is to be tested. Does the addition of this new postulate clear up any obscurity?—Is this new postulate one of the assumptions of Science?

The truth about this whole matter of universals seems to be that it belongs to the theory of notation primarily, and then to psychology and ontology.

The mind proceeds to obtain correspondence with its alternative by analysis and synthesis. The recognition of difference or otherness is an indispensable condition of consciousness itself. One phase of the recognition of difference is that activity called abstraction. But along with difference comes the recognition of what is different from difference, or likeness in all its grades and involutions. The sense of relation, and the impulse of generalisation also arise, and altogether these mentalities become effectual in virtue of some system or some plexus of systems of notation. Long before man ever began to reflect upon his mental operations and the means or tools employed on that behalf, his mental manners and customs had become a second mental nature. What warrant have we for taking these mental manners and customs as the same are reflected in ordinary language as adequate criteria for the world-problems, or even as representative of the very constitutional laws of thought itself? Just as philosophy found it profitable to postpone ontology to psychology, so it is submitted may it again find it profitable to postpone psychology to a study not merely of language but of notation generally, of which the notation of mathematics will undoubtedly be found the most significant. Here we have distinction, abstraction, assimilation, relation, and generalisation carried on and carried out with unchecked thoroughness, and systems of universals ascertained that not only correspond exactly with every acquired and incoming item of our experience, but are also in respect to one another continuous throughout the whole of their range. It will be impossible for any one who once appreciates the

nature and competence of mathematical notation to regard any theory of universals relating to ordinary language as a solution of its problem that does not conform to the perfect models set in mathematics.

Dr. Abbott claims that *scientific method* is neither more nor less than the application of his theory. Granting that science makes the same presumptions, can scientific method be said to be neither more nor less than the application of his theory in any other sense than it could be said to be neither more nor less than the application of the theory of the existence of matter, energy, ether, and mind?

The scientific method consists not in its data but in the ways in which it deals with its data, in other words it consists in its logic. It observes and infers. It never stops to inquire if what it observes are the "things in themselves" or only phenomena. That is an utterly inconsequential question to it. It tests the validity of inductive and hypothetical inferences by comparison with experience, and phenomenal experience is every whit as good a criterion for it as any other. It has a metaphysics of its own which is mathematics and which it acknowledges as the supreme and unquestionable arbiter over whatever of its presumptions and theories that arbiter may undertake to govern.

No philosophy that neglects to comprehend and apply the now supremely important methods and results of mathematics can be anything but an ineffectual attempt. No doubt this will seem to most of those who affect philosophy a statement worthy only of scorn. Prof. Crystal, at the close of his article on "Parallels," in the ninth edition of the Encyclopedia Britannica "calls the attention of those who busy themselves with mental philosophy" to that geometrical subject and its affiliations "as one of the results of modern mathematical research which they cannot afford to overlook." We can imagine with what an air of conscious eminence one or more of our dilettanti philosophers may have perused this suggestion, wondering what in the world parallels and measurement have to do with philosophy.

But, nevertheless, so it is that a new departure in philosophy has been made inevitable by the stupendous researches of modern mathematics and this the philosophical world is just beginning to find out. It seems to us, that the incomplete view taken by Dr. Abbott will prevent that success for his theory which his most distinguished ability might otherwise achieve, and which his devoted efforts well merit. F. C. R.

RACES AND PEOPLES: LECTURES ON THE SCIENCE OF ETHNOGRAPHY. By *Daniel G. Brinton*, A.M., M.D., etc., etc. New York: N. D. C. Hodges.

These lectures, which are dedicated to Mr. Horatio Hale, the veteran philologist and ethnographer to the United States exploring expedition in 1832–42, go over a very wide ground. The ground traversed is, indeed, so extensive that Dr. Brinton feels bound to apologise for being often superficial, as otherwise he could not have compressed into so small a space the subjects of which he treats. This apology must necessarily to some extent disarm the critic, although it should do so

only where a conclusion is not supported by sufficient evidence. Where a statement made is not merely unsupported by, but is contrary to, the best evidence available, the author must expect to be called to account. We were prepared to act on this principle, thinking that possibly confession like charity would be found to cover a multitude of sins, but we must admit that with certain exceptions, the chief of which are to be found in the lecture on "the psychical elements of Ethnography," we were mistaken.

We do not propose to follow the author in his classification of the varieties of mankind, or in his views of the origin of the various races into which they are divided, both of which will meet with keen opposition from most of the anthropologists of Western Europe, although those of Germany may receive them with more favor. We are concerned chiefly with the opening and the closing chapters of the work before us, from which we may draw some conclusions bearing on the race question, that disturbs the minds of so many people in this country. Dr. Brinton remarks that the physical traits of man are correlated to the physiological functions in such a manner as profoundly to influence the destiny of nations. He adds that from the physical point of view, the pure white is weaker than the dark races, worse prepared for the combat of life, with inferior viability; but in the white this is more than compensated by the development of the nervous system and intellectual power. The white "can bear greater mental strain than any other race, and the activity of his mind supplies him with means to overcome the inferiority of his body, and thus places him at the head of the whole species." It might be supposed that a mixture of races having these different qualities, would result in the formation of a hybrid race, superior to either of the parent stocks.

Dr. Brinton, who is strongly opposed to the practice of miscegenation, endorses the opinion that the offspring of a cross between the white and the black races are deficient in physical vigor, and that such hybrids gradually die out. He admits, however, that it was not so within the African area in early times, and he suggests that special causes are now at work to affect the results of race-mixture. One of these is the fact that the white blood is derived exclusively from the father, and the dark blood exclusively from the mother. Now, if it be true, as is supposed, that physical qualities are derived chiefly from the father and the psychical qualities chiefly from the mother, we may reasonably expect, as is indeed recognised, that the children of such unions will be physically superior to members of the black stock, although inferior to those of the white race. It is admitted, moreover, that mulattoes are, as a rule, intellectually superior to pure negroes; so that miscegenation is undoubtedly of relative advantage to the immediate offspring, whatever may be its result on their descendants. What Dr. Brinton and other writers of the same opinion object to, however, is the deterioration of the white stock. If there was any reason to believe this possible, the objection would have weight. But it supposes miscegenation to become general, which, in the first place, is an event which could never happen, unless the women of this country descended to the level

of a Messalina. And in the second place, Dr. Brinton admits that "in the earlier conditions of social life, no such debility attended the crossing of the Eurafrican [white race] and African race as seems at present to be the case." It is possible, therefore, that if the mixture of the two races became general, and were regarded as perfectly legitimate, the present physical and intellectual debility attending such unions might disappear. We do not advocate miscegenation, but we wish to point out, that those who oppose it under the present limitations of our knowledge, do so either on insufficient grounds, or because they are influenced, consciously or unconsciously, by sentimental considerations.

We are glad to see that Dr. Brinton does not endorse the views so prevalent among English Ethnologists as to the existence of "communal marriage" among the lower races of mankind. In his recent work on "The Origin and Development of Marriage and Kinship," Mr. C. Staniland Wake has dealt exhaustively with that subject, and shown that the "marriage law" is fully recognised among the most savage peoples. We cannot accept Dr. Brinton's statements where he says that the Australian aborigines are led to associate "by much the same motives as prompt buffaloes to gather in a herd," or when he speaks of the "rare" custom of polyandry, or declares that mutual affection has no existence among the Australians and many other tribes, and that romantic love is practically absent among the African and Mongolian races. Our author is equally at fault when he says that no Asiatic nation respects truth telling, and that "the idea of independent personal ownership does not exist among them." These errors, and such mistatements as that "the excellent results of the extension of the Slavonian supremacy in Central Asia have been studiously ignored by British writers," which are due to Dr. Brinton's preference for Continental authorities, are serious blemishes. Nevertheless, his book is an excellent one, and we can heartily recommend it as an introductory Manual of Ethnology. Ω.

STUDIES IN HEGEL'S PHILOSOPHY OF RELIGION. With a Chapter on Christian Unity in America. By *J. Macbride Sterrett*, D. D., Professor of Ethics and Apologetics in Seabury Divinity School. New York: D. Appleton & Co.

These studies in Hegel's Philosophy of Religion, except Chapters III and VIII, claim to be something more than a mere expository paraphrase of Hegel, although following Hegel's argument in Chapter IV. The author's purpose is strictly theological and *apologetic*. His work is written with faith, and in the interest of "the faith." In fact, in England and America the theological rather than philosophical interest taken in the study of Hegel has mainly been called forth by the supposed intimate relation of his thought to religion and to Christianity regarded as the absolute, full, and final religion. To this pseudo-Hegelian school of England and America, Hegel, above all, is radically a *theologian;* all his thoughts beginning and ending in that of divinity. It regards Hegel's Philosophy of Religion as the very

heart of his thinking, as "the highest bloom of his philosophy." It is supposed to reconcile Christian theology with the modern science of religion (or comparative religion), with anthropology, and with the classification of positive, pre-Christian religions. American students of Hegelian philosophy, as a rule, do not desire to be regarded as Hegelians. "Bound to swear in the name of no master in philosophy, and only in the name of Christ in religion, would better characterise them all. They are simply using his *method* . . . . they are getting great help, and looking for still greater from the method, which was greater than even Hegel's own employment of it." Hegel's method is thus declared to be greater than himself, and is received like an article of faith. In these studies, while freely discussing and criticising all that Hegel has thought or said upon the subject of the philosophy of religion, the author entirely omits to enter into a critical discussion of precisely the most important point; namely, the absolute value of Hegel's philosophical *method.* He overlooks the interesting fact, that all that is permanently true and great in Hegel was really reached by Hegel himself, and understood, from a point of view that was *diametrically opposed to his own accepted method;* in glaring contrast to his evolution of the logical idea, and to his theory of "pure thought" or "reines Denken." "To reconcile reason with religion, by finding reason in religion and religion in reason," is doubtless a correct Hegelian statement, yet, at the same time, it only expresses an exclusive, one-sided aspect of the system.

There was a time when the Hegelian system ranked as a foremost intellectual phenomenon. It was, perhaps, the highest that philosophy ever had achieved; but its manifest fault consisted in its being a purely philosophical and *a priori* system. A philosophy that existed in external opposition to the sciences remained only an empty abstraction, just as force when severed from the phenomenon, or Deity when opposed to the outside world. Hegel's philosophy ultimately recognised, that force only is or exists in the phenomenon; that the internal itself constitutes the external, the Deity is only present in the universe, the infinite in the finite. Any philosophy proclaiming all this must be said to have succumbed with a vengeance to its own dialectic process.

A philosophy of this kind would seem to have signed its own death-warrant—or according to the popular German saying, "hat selbst den Stab über sich gebrochen!" And thus it really happened to Hegelianism—we mean to *genuine German* Hegelianism. From that moment it forfeited its claim to be regarded as the highest truth. It was compelled to step forth out of its one-sided exclusiveness, out of its opposition to empirical science. Hegelianism was not expected to effect any kind of compromise or reconciliation with empirical science, because any yielding on its own part would have been illogical, and could only have brought about a momentary truce, but no lasting peace. On the contrary, Hegelianism had to suffer the infinitely bitter pang of self-immolation. It had deliberately to commit suicide, in order thereupon to be welded with empirical science into a much higher and more comprehensive *unity*. In other words,—in fact *in Hegel's own words* —

"when the old principle thus reappears, it is no longer what it was before, for it is changed and purified by the higher element into which it is now taken up."

The Hegelian system was thus compelled to acknowledge, that not only must philosophy agree with experience, but moreover, the creation of a philosophical science premises as an indispensable condition the hypothesis of an empirical science, which itself implies that the ideas of space, of time, of movement, and of matter cannot be obtained *a priori*,—that is before the experience of the things themselves,—or be purely evolved, according to the Hegelian method, from the logical idea. To attempt to reconcile reason with religion by finding reason in religion and religion in reason, is simply to evolve *a priori* a philosophy of religion from the logical idea. This is believed to be possible by means of the mystic factors—"the Hegelian method" and the "Logos." The original contents of eternal reason itself—of the *logos*—are supposed to exist within our mind in a form that constitutes our inmost truth; our spontaneous logical thinking coincides with the innate eternal reason in form and contents, and thus attains to the full revelation of itself.

But all this is purely an hypothesis, or a kind of belief in reason, "der Glaube an die Vernunft!" Hegel himself in conclusion was forced to admit that philosophy must closely observe the method of nature. (See Encycl. III, 22.) The editor of Hegel's Philosophy of History (Gans, page XV) says, "Hegel did not wish to personate the deity that creates or evolves history, but to be a man who contemplates created rational history"; and Hegel himself says (page 13), "we must take history as it is; we have to proceed according to an historical, empirical method. . . . . Only from the study of history itself are we allowed to infer that historical events are really rational events." And in Hegel's "Naturphilosophie," (page 24,) and elsewhere there are to be found perfectly analogous passages.

It cannot be denied, that the author of this work on Hegel's philosophy of religion has made a deep study of all the vast details of the Hegelian system; but his one-sided theological criticism exclusively aims at representing Hegel himself as a theologian. This American pseudo-Hegelianism may probably have had the effect of stimulating American thinkers, but in other respects it has only retained the phantom and empty shadow of Hegelianism, playing fast and loose with the old system under the captious name of the "Hegelian method," and making a free use of its obscure, obsolete phraseology. The cry "back to Kant" by English Neo-Kantianism, is declared to mean a speedy return to Hegel's method, and to be only the first step of the protest "against temporary, materialistic, and psychological thought."

The last chapter, in the form of an appendix, is devoted to the discussion of "Christian Unity." The author deplores the current abstract conceptions of the church, and regards them as the main obstacle to its visible organic unity. The Hegelian ideas on religion and the state are believed to suggest a more concrete, historical view, and to destroy the abstract conception. γνῶν.

THE PHILOSOPHY OF NECESSITY; OR, LAW IN MIND AS IN MATTER. By *Charles Bray*. Third edition, revised and abridged. London and New York: Longmans, Green, & Co.

This work was originally published in 1841, and comprised an Exposition of the Doctrine of the Philosophy of Necessity, or the Law of Consequences, first, in its relation to Mental Science, secondly, in its relation to Ethics, and thirdly, an application of its principles to the social questions of the day. The third part has been omitted from the present edition, as being out of date, but many of its statistics and observations are given as an Appendix. In a prefatory note it is stated as a reason for preserving in an accessible form the conclusions arrived at by Mr. Bray, that he "worked out for himself a theory as to the purpose of existence that satisfied his own mind, and became to him a cheerful philosophy which intensified his enjoyment of all things good and pleasant, helped him to bear the troubles of life, and to meet the end in a spirit as bright as it was resigned"—a statement which those who knew him personally will heartily endorse.

Mr. Bray's theory is embodied in the title of the work under review, and its key-note is "order in nature." His object is to show "that the mind of man is not an exception to nature's other works; that like everything else it has received a determinate character; that all our knowledge of it is precisely of the same kind as that of material things, and consists in the observation of *its order* of action, or of the relation of cause and effect." According to this view we can know the real nature of neither matter nor mind, Nature herself having fixed the boundaries beyond which human knowledge cannot extend. It would be a mistake, however, to suppose that Mr. Bray regarded Nature as something apart, giving to man laws from the operation of which it is itself free. A little consideration shows that such is not his idea. Nature is with Mr. Bray only another name for God. Moreover, man is nothing, God is all; "individuality, or anything separate from Him, is a mode of thought, and has no real existence." Electricity, heat, light, and other forces of nature are modes of the Unknowable, and are transformable into each other and into the other modes which we distinguish as sensation, emotion, thought. The qualities or properties of matter are mere force or power, and as they are qualities of God, the assumption of the existence of matter is not necessary. God "is the Universal Being, of which all things are the manifestations. Every thing is a mode of God's attribute of extension; every thought, wish, or feeling, is a mode of His attribute of thought."

To Mr. Bray the only *reality* is God, the great Unknown, and as He is also the Unknowable, we have in the Philosophy of Necessity a system of Agnosticism. And yet Mr. Bray is hardly consistent with himself. For, unlike Mr. Herbert Spencer, he speaks of God in terms of Spirit, which becomes in his system identical with force. When, moreover, he declares that "the whole sensitive existence is but the innumerable individual eyes with which the Infinite World Spirit beholds Himself," we have a kind of Monism. This view however recognises God as "the

only real and efficient power in the universe," and, as the Great First Cause and the Great Last Cause of all things, a Divine Being. Mr. Bray does not enter into the question of the personality of God, but that he supposes the Deity to possess consciousness is evident from his reference to the Great Soul of Nature, and his statement that the operation of its forces is governed by thought. His ideas are summed up in the words, "we feel ourselves a part

> "Of that stupendous whole,
> Whose body nature is, and God the Soul."

Holding this opinion, Mr. Bray could not be otherwise than a Necessitarian and an Utilitarian in his practical views. These are well shown in his treatment of the question of the freedom of will, as to which he accepts the opinion of Locke that a man is free within the range of the preferences or directions of his own mind. Mr. Bray's own conclusion is: "Since, then, the only freedom we have is limited to action in accordance with our natural powers and capacities, our aim must be to develop fully these powers and capacities, and to remove all impediments, external and internal, to their free and complete action. There must be no external compulsion from physical impediment, or internal compulsion from defect in the mind itself; no obstacle to the full exercise of our natural powers both of body and mind. Education in its full meaning is the developing and perfecting of all these powers."

Ω.

GESCHICHTE DER ETHIK IN DER NEUEREN PHILOSOPHIE. By *Friedrich Jodl*. Volume II. Kant and the Ethics of the Nineteenth Century. Stuttgart: J. G. Cotta.

In this volume Professor Jodl continues his history of theoretical ethics; starting with Kant and coming down to contemporary philosophers. His work is thus mainly concerned with the classical philosophy of Germany till Feuerbach's time, and the spiritualistic and positivist philosophy of France and England down to the time of Cousin, Jouffroy, and Mill. Professor Jodl has been obliged to forego his original intention of appending to his work an epitome of the logical constructive results of his investigations, and has exclusively applied himself to the investigation and historical presentment of the fundamental and central principles of the ethical thought of the past century. He has therefore ever held in view the economical and historical purpose of his work, and avoided on the one hand an exposition of all systems in which originality of principles is lacking, and on the other abstained from the critical examination of the systems of his contemporaries. Thus he has aspired, by the constant emphasis of central basal principles and of the points whereon all have agreed, to refute the belief that the history of his science is a chaotic mass of contradictory views, and that ethical opinion presents in its historical expression only diversity, and never community of mental possession. Professor Jodl has only collaterally dealt with the non-ethical literature and tendencies of the times of which he treats, and he has disclaimed all intention of portraying the effects and influence that ethical systems have produced and exerted in

practical spheres; France and England being the only instances in which, for manifest reasons, the discussion of literature and politics has preceded the criticism and analysis of philosophies. Nevertheless, his work throughout is interspersed with many well-judged and apposite thoughts upon the effective, though not always apparent, influence of a nation's intellectual activity upon its practical conduct of affairs; as well as, also, regarding the lamentable fact that, often, a people are violently and dangerously engaged in the solution of questions that their thinkers have solved decades before.

Let us look at Professor Jodl's examination of the historical position of Kantian Ethics. The element of non-interest in ethical judgment we find not to have been first emphasised by Kant. Whatever the success and worth of their speculations, a great many of Kant's predecessors sought to realise this very factor in their systems; thus it was with Plato as opposed to Protagoras, with Shaftesbury and Butler as opposed to Hobbes, Locke, and Hume; while Cudworth, Clarke, Wollaston, and Price were similarly actuated by the purely speculative consideration. Kant's real and original advance upon previous systems of ethics, was his emphasis of the element of conscious volition in ethical judgment and the statement of its imperative character. It was just in this last respect that his ethical philosophy formed so marked a contrast to the eudæmonism of the seventeenth and eighteenth centuries. The imperative and absolute nature of duty; eudæmonism neglected to inculcate; Kant aroused the conscience of his time, and presented in contrast to the moral weakness then prevalent the strength and earnest grandeur of an absolute conception of duty.

So too in the conflict between the metaphysics of ethics and the practical postulates, wherein the great philosopher displayed so much ingenuity, Professor Jodl is unable to distinguish Kant's position very sharply from that of the English intellectualists when in a similar plight. Not that the idea of the practical postulates is valueless; this Professor Jodl afterwards explains. Our historian merely shows that Kant had not yet gotten clear of the ancient conflict that had agitated the Schoolmen of the Middle Ages as well as the utilitarian and rationalistic theologians of more modern times. Yet despite the mysticism that inheres in Kant's argument for the practical existence of God, the kernel of the truth he emphasises in the alliance of ethics with religion still remains; namely that religious ideas are essentially ethical, that in this relation only have they meaning, and that religious ideas which are ethically valueless are to be uncompromisingly discarded.

Especial attention should be called to Professor Jodl's estimate of Feuerbach, whose merits have been strangely neglected. Feuerbach's ethical system, in perfect form, has not been independently set forth in his works, but is intermingled with the subjects dealt with in his religious treatises. Yet he left few of the fundamental questions of ethics untouched and his works contain a great store of most excellent and pertinent thoughts which must be characterised, says our author, in the widest sense of the term, as the real foundation in ethics of modern scientific empiricism.

With regard to the presentment of English and French ethical philosophy, Professor Jodl's work, it is claimed, is the first historical exposition in the German language of this special department of thought in its connection with the universal intellectual progress of these two countries. His analysis of Bentham and Mill is very accurate and full.

Professor Jodl exhibits an extensive acquaintance with English philosophical literature; indeed, he has even discovered the little book known as "Kant's Ethics," by Dr. Noah Porter, whom he calls the "Nestor" of American philosophy.

Unity of execution, and the skilful employment of historical perspective in dealing with the various phases of ethical thought, may be characterised as prominent merits of Professor Jodl's performance. In the books of its class it stands unique. *μκρκ.*

ETHIK. Eine Darstellung der ethischen Principien und deren Anwendung auf besondere Lebensverhältnisse. By Dr. *Harald Höffding*, Professor an der Universität zu Kopenhagen. Unter Mitwirkung des Verfassers aus dem Dänischen übersetzt von F. Benedixen. Leipsic: 1888.

Harald Höffding, Professor at the University of Copenhagen, is a representative thinker among ethical scholars. Unhesitatingly he takes his stand upon the real facts of life and attempts to construct a system of ethics which shall be a science among the other sciences. Professor Höffding says in his preface:

"If we see the snow-covered peaks of a mountain range from a far distance, "they seem to hover in the air. Not until we approach do we discover plainly that "they rest upon solid ground. It is the same with ethical principles. In the first "enthusiasm one imagines that a place should be assigned to them above the reality "of nature and life. On further reflection and after a longer experience, which "must perhaps be dearly bought, we discover that the ethical principles can regu- "late life only if they have really proceeded from life."

Professor Höffding is in a certain sense a utilitarian. The influence of utilitarian systems upon his mode of thought can be traced throughout the whole work, and it is this influence perhaps to which the Danish Professor owes his positive standpoint as well as the scientific method of his procedure. Nevertheless he differs from the ordinary utilitarian school and prefers to characterise his system as an ethics of general welfare. He says:

"The so-called utilitarianism,—that ethical conception which has been founded "mainly by Bentham,—has the merit of having for the first time energetically pro- "pounded the principle of welfare. Yet Bentham has detracted from his cause by "proceeding from a psychological theory which considers consciousness as a sum "of ideas and feelings, and dissolves society into a number of individuals. The "import of pleasurable and painful feelings for the continuous and general welfare "cannot be established by a mere process of calculation." (P. 37.)

Professor Höffding opens the first chapter of his work with the following sentence:

"Ethical judgments contain a valuation of human actions. . . . The criterion "of the ethical valuation is the contents of ethics."

If life consisted of isolated sovereign moments, every one of them would have an equal right, and no one would be obliged to resign in favor of any other moment. No valuation, no discrimination would be required. But the life of each individual, as well as the life of society, makes up a "life-totality," and we possess a conception of this life-totality. "If the state of feeling in a single moment agrees with the conception of the life-totality, a new feeling arises which is determined by this mutual relation. . . . The ethical valuation is conditioned by this feeling." (p. 27.) Taking this ground, Professor Höffding defines good and bad in the following way:

"'Good' accordingly becomes that which preserves the life-totality and gives "fulness and life to its contents; 'bad,' on the contrary, that which has more or "less the tendency to dissolve or to limit the life-totality and its contents. Bad "accordingly is the single moment, the separate impulse in its revolutionary isola-"tion from the rest of life. . . . ." (P. 29.)

"The Bad, therefore, is egotism in its various degrees and various forms. "And the verdict about it will be the severer the more conscious this egotism is."

Utilitarianism as a rule has been hedonistic. Utilitarians have proposed as the criterion of an ethical valuation the consequences of an act; if the consequences give more pleasure than pain, is is said to be good; if they are attended with more pain than pleasure, it is said to be bad. In the above quoted definitions by Prof. Höffding there is no trace of hedonism, and I should consider an ethical system based upon these definitions as being in strong opposition to hedonism. But Prof. Höffding appears to have been so strongly biased by the influence of hedonistic utilitarianism, that he introduces again its fundamental idea, which identifies the good with the pleasurable. Although he objects to employing the terms "utility" and "happiness," "because they are liable to lead to misunderstandings and have indeed done so"; although he declares that "momentary feelings of pleasure and pain are no sure criterion for the total state" (p. 37); although for such reasons he proposes the word welfare, saying, "by the word 'welfare' I think of everything which serves to satisfy the wants of human nature in its whole entirety": still Prof. Höffding again returns to hedonism by limiting the idea "welfare" to the hedonistic conception of goodness. He defines welfare as "a continuous state of pleasurable feelings." (P. 98.)

Thus we are presented with two definitions of what constitutes the criterion of an ethical valuation: (1) that which promotes the life-totality, and (2) that which produces a continuous state of pleasurable feeling.

These two definitions are in many respects harmonious, but on the other hand they may come into conflict; and if they come into conflict, which of the two is to be sacrificed? Supposing that a contemplation of the evolution of organised life

should teach us that the development of a "life-totality" is not at all a pleasurable process; that on the contrary it is attended with excessive and innumerable pains. Inorganic nature so far as we can judge is free from pain. The isolated atom, we may assume, exists in a state of indifference. Supposing now that pain could be proved to increase, the higher we rise in the development of a life-totality; supposing that the growth of a life-totality had to be bought with pain, what would be the consequence? I will not here enter into the subject, but I may mention that this supposition is not at all without foundation. Assuming that it were so, would not, in such a case, the good be as Schopenhauer, Hartmann, and Mainlaender propose, that which destroys the life-totality of consciousness and with it the whole world of civilised humanity, built up of the innumerable consciousnesses of individuals?

Professor Höffding has seen this difficulty, which arises from a conflict of the two criteria of ethical valuation (1) the hedonistic principle and (2) the principle of progress, i. e., the constant evolution of a higher life-totality. He says:

"John Stuart Mill has declared that it is better to be a dissatisfied man than a "satisfied pig, a dissatisfied Socrates than a satisfied fool. He bases this assertion "upon the fact that even if the pig and the fool were of a contrary mind, their "opinion would have to be rejected, since they possess no knowledge of the "higher point of view from which man and Socrates consider life, whereas man "knows the needs of the pig and Socrates fathoms the fool. We must be regulated "by the judgment of those that know the two kinds of needs in question and that "are consequently able to institute an estimation of the value of the same.

"But I feel obliged to put in a word for the pig and the fool. The difficulty is "greater than Mill imagines. Man, it is true, knows all the wants of the pig, and it "would not be difficult for a Socrates to comprehend those of the fool. But man "does not have the wants of the pig, nor Socrates those of the fool, as his *sole and* "*only dominant* wants. And yet this is the very circumstance that determines the "matter. Man cannot transform himself into a pig without ceasing to be a man, "and a Socrates will hardly be able so to identify himself with a fool as to lose "completely his Socratic wants. If, now, the pig can attain the *complete* satisfac- "tion of all *his* wants, is not his happiness greater than that of man whose desires "and whose longings are never wholly satisfied? And the fool, who does not "nourish many thoughts and makes no great demands upon life, is he not happier "than Socrates who spends his whole life in striving to know himself and to stimu- "late others, only finally to declare that death is really preferable to life?"

Professor Höffding's solution of the difficulty is summed up in the following paragraph:

"Welfare is an illusion if we understand by it a passive condition of things, "created once for all. It must consist in *action*, work, development. Rest can "only mean a termination for the time being, the attainment of a new level, upon "which it is possible for a new course of development to proceed."

Thus it appears that Professor Höffding decides in favor of the second prin-

ciple. The evolution of the life-totality is considered higher than a continuous state of pleasurable feeling. Nevertheless Professor Höffding adds:

"On that account, however, we are not obliged to retract our first definition of "welfare as that of a continuous state of pleasurable feeling. That which must be "rejected is only the notion of a passive state."

Truly, as Professor Höffding says, "the difficulty is greater than Mr. Mill imagined." The difficulty is great enough to undermine the whole basis upon which welfare is defined as "a state of continuous pleasurable feeling." If, as Professor Höffding declares, welfare is to be interpreted as activity, work, development; if this kind of active welfare is the greatest good, whatever admixture of pain and whatever absence of pleasurable feeling it may have; if the greatest amount of a state of continuous pleasurable feeling is not welfare in an ethical sense, what becomes of the utilitarian definition of welfare as pleasurable feeling? If, however, welfare is "the state of a continuous pleasurable feeling," how can we declare that the life of a pessimistic philosopher is preferable to that of a joyful fool?

Must not the ultimate reason of this conflict be sought in Professor Höffding's statement that—

"The proposition of a purpose presupposes in the subject which makes the pro-"position feelings of pleasure and displeasure." (P. 30.)

Should we not rather say that the proposition of a purpose presupposes an expression of *will* in the subject which makes the proposition? Wherever there is will, there is also approval and disapproval, but approval is not always pleasurable and disapproval is not always attended with displeasure. Does it not often happen that we cannot help disapproving of things which please us?

We have mainly limited our review to some topics of the first division entitled "The Conditions of Ethics," because we have regarded them as most important in a representation of the ethical principles. The doubts we have raised as to the consistency of the author are less noticeable in the remaining chapters, which contain an unusual store of ideas presented with great lucidity. The doctrine of the freedom of will is excellently treated (chap. v.). Social ethics, family life, marriage, the position of woman, and the education of children are separately and exhaustively discussed, and there is no chapter which even if we cannot always give assent to the author's views, does not richly repay a careful perusal.

P. C.

KURZGEFASSTE LOGIK UND PSYCHOLOGIE. By *Dr. K. Kroman.* Translated from the second edition of the Original by F. Bendixen. Leipsic: O. R. Reisland.

Dr. Kroman is professor of philosophy at the University of Copenhagen. He has sought to present in this book of three hundred and eighty nine pages the elements of Logic and Psychology. The work was principally intended for the use of the general reader and the beginner, although its author hopes it will not

be altogether without interest to the specialist, and that it will find its way into the schools of pedagogy (the subject of the art of education being also incidentally dealt with in its pages).

Dr. Kroman's method of presentation is concise and lucid; the elements of logic occupy but some one hundred and four pages, and form a good introduction to the common phases of that science.

But his psychology is, from our standpoint, more open to objection; or rather his philosophy. He says: "Unless we assume the law of causation, research is impossible; but assuming this, it is impossible to stop with states of consciousness, we must assume a subject and *real* objects." What Dr. Kroman means by *real* is seen from the following. "Our senses give us knowledge only of *properties* of things, not of *things*. We do not perceive the apple, but only its form, color, etc. But all these sensations thus derived form an interconnected whole; and the law of causality forces us to the assumption of a *thing* behind these sensory manifestations. Yet, our belief that we know this *thing in itself* has only a practical value; in reality it is an unknown quantity. It is a single point, a nucleus, of which *direct and positive* knowledge is unobtainable; yet exist it must if our assumption of the law of causation is to be upheld." Thus Dr. Kroman shows in an admirable manner how our everyday conceptual life *is* formed; but it is the office of philosophy, in our view, to point out how this same conceptual life *should be* formed. However, Dr. Kroman supplements this explanation—which we have much abbreviated—by considerations that lead one to believe that he seeks only to demonstrate the reality of existence and has collaterally accepted the doctrine of the independent, 'outside' thing in itself. We may refer our readers, regarding this question, to Prof. Mach's article in this number of *The Monist*. μκρκ

EINLEITUNG IN DIE PSYCHOLOGIE NACH KRITISCHER METHODE. By *Paul Natorp*. Freiburg: J. C. Mohr.

In this exhaustive monograph Dr. Paul Natorp does not deal with psychology itself, but proceeding from a number of novel points of view he opens up the road by which the principles of psychology may be reached. The author frankly assumes that psychology even as yet has not absolutely and clearly defined its own *fundamental problem*, and that this is chiefly the reason why we still disagree concerning the significance and value of many of the results of psychology. Before we approach the solution of the special problems, psychology *itself* must be laid down as a problem. The author, therefore, in the first part of his introductory task has sought to indicate the *objects* of psychology,—namely, what it will and rationally can pursue; and in the second part, he points out the only correct *method* according to which psychology can accomplish its aims.

Since Descartes, says our author, real and possible consciousness constitutes the true limits of the province of psychic research, the fundamental problem of psychology, and the characteristic distinction between the old and new philosophy.

But, in order to find out, whether this tendency of the new philosophy has been entirely successful, it will be necessary to examine more closely the nature of the fundamental psychic phenomenon, and the problem that it involves.

In the fact of consciousness we can distinguish several elements which really are inseparable, but which in the study of the problem ought to be separated. There is the content of which one is conscious, and secondly, the consciousness thereof, or its relation to the ego; and, by a further abstraction, this relation itself might be distinguished from the total fact of consciousness. The relation to the ego, in ever varied contents, is one and the same; it makes up both the common and specific element of consciousness, and as the third abstract element of consciousness (Bewusstsein) it might aptly be called self-consciousness (Bewusstheit). The ego, being a common point of relation to all contents of consciousness, cannot itself become the content of consciousness, because it represents a contrast to any idea of content. We do not correctly conceive consciousness as a thing, a cause, a force, an explanatory principle, but simply as a phenomenon—the fundamental phenomenon of psychology. We thereupon ask, what contains this phenomenon, and by what is it characterised? It is, above all, characterised by *subjective* experience. This denotes, that it is *I* who am conscious of a content. The reflective expression "I am conscious" implies a "subject" that is conscious. Without this reflective relation to the ego, consciousness no longer conveys any meaning Consciousness denotes *self*-consciousness. This reflective relation is therefore the only distinctive mark of all conscious phenomena.

Content we call anything that can be related to the ego. In the language adopted by psychologists, a feeling or a desire can also be regarded as content of consciousness. But our investigation cannot proceed beyond this reflective relation. If we attempt a *representation* of the ego, we should turn it into *object*, and we should have ceased to regard it as *ego*. The ego is never an object—not even to itself.

It is not denied, that in every consciousness there can be distinguished two elements—the existence of a content, and its relation to the ego; but it is denied, that this relation can be made objective, even to itself. This correctly describes the character of consciousness, as content and activity, and moreover, precisely delimits the domain of the psychical and determines the *positive* task of psychology. Those, who assume a consciousness of consciousness, ought logically to admit the consciousness of a consciousness of consciousness, etc.; as indeed some metaphysicians have done.

It may be maintained, however, that the distinction of the activities of consciousness, of sensation, representation, and thinking, is indispensable in psychology; but, at any rate, there are no different *kinds*, or even degrees or stages of consciousness. The consciousness of any simple sensation in kind is not different from the consciousness of a world; the factor of consciousness in both is the same;

the difference lies exclusively in the content. This also applies to clear and obscure consciousness.

In order to determine the positive task of psychology, we ought to discover in every content and in every repeated act of consciousness, a certain common characteristic. Perception, as such, does not constitute consciousness, but merely denotes the presence of a multiple content; apperception, on the other hand, indicates only consciousness in the definite sense of a "unity" of that multiple content. This unity of consciousness properly does not appear, or only appears in the connection of the contents. That peculiarity of consciousness which we call apperception, is psychologically only apparent in the contents of consciousness; it does not constitute an object of psychology, but forms only its extreme limits. The common characteristic of every content of consciousness is therefore really to be found in the *connection* (Verbindung) in which the simple contents are represented in the repeated acts of consciousness. This connection exists only subjectively, irrespective of all objective meaning or value.

The existence of phenomena purely as phenomena, their subjective existence irrespective of object, constitutes their psychic existence or that side of the phenomenon from which it becomes an object of psychological research. Under this head come all those phenomena to which science denies an objective value: illusions of the senses, mental hallucinations, and the normal non-scientific representations of things, the creations of the imagination in music and in art, the entire subjective life of feeling and of aspiration, regarded only as a particularly characteristic association of representation, irrespective of all objective truth, which lies beyond the limits of psychology as such.

The characteristic, accordingly, is found in the *unity* in which the content represents itself in the single or reiterated acts of consciousness. In each act of consciousness the content is simply present, and no time is distinguished. When we distinguish time, a plurality of consciousness also must be distinguished. It may seem difficult to understand how two or more original acts of consciousness are again united into one act; but in reality this takes place. The idea of unity is thus enlarged, and becomes the consciousness of a multiplicity, the necessary unity of a multiple, a successive connection in time, and a simultaneous connection. All consciousness (representation) depends on connection, as is indirectly shown by trying to discover whether the elementary contents of consciousness can be represented in absolute isolation.

Abstract consciousness is thus found to be the relation of given contents to an ego, and connection constitutes the manner in which a multiple content appears or is represented in the reiterated relation to one and the same ego. Connection is the *concrete expression* of that relation itself, through which consciousness attains its definite and positive value. Abstract consciousness seems poor, but the multiplicity of a definite connection of contents affords a vast field of psychological re-

search, for on that connection depends the concrete significance of the ego, which to us is not subject in general, but above all, is our own particular subject.

And finally at this point there spontaneously arises the question of a theory of the psychic phenomena. Every theory essentially presupposes an *objective* tendency, while consciousness, as the expression of the purest *subjectivity* of phenomena, cannot be rendered objective. It clearly follows, therefore, that the *method* of psychology must be radically different from all methods of the objective sciences.

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DER GENIALE MENSCH. By *Cesare Lombroso*. German Translation by Dr. M. O. Fraenkel. Hamburg: Verlagsanstalt und Druckerei-Actien-Gesellschaft (vormals J. F. Richter).

The French edition of Lombroso's "Man of Genius" has already appeared The work is introduced by a preface written by M. Charles Richet, which reviews the subject with great clearness. All in all, this is an admirable book, well stocked with interesting facts and incidents, and well adapted to obtain a large number of readers outside of scientific circles. There is necessarily a dearth of abundant and well-authenticated facts in this subject,—historians until lately not having occupied themselves with the psychological phases of life; and accordingly there is great danger in universal generalisation from those that we have. This, however, Prof. Lombroso has recognised.

Genius, the author claims, is a variety of psychosis, an instance of degeneration. Degeneration of certain parts is the condition of the acquisition of others; thus the loss of a number of ribs and muscles, of a tail, etc., has in man been compensated by the acquisition and development of the brain; and so in the genius the possession of very great intellectual or emotional faculties has been counterbalanced by the loss of equilibrium in the other parts. Moreover, there are no exceptions in nature; the occurrence of insanity, abnormalities, and eccentricities in a few cases leads us inevitably to the conclusion that there are correspondent defects in all others. And this we find to be true in all historical instances. Popular speech and tradition have identified genius and demency: in Hebrew and Sanskrit the words prophet and insane are synonymous; and so we have the proverbs—'Children and fools speak the truth,' 'Un fol avise bien un sage,' 'Saepe etiam est morio valde opportune locutus.' The line of demarcation between the two is hardly traceable. Genius is the exception, a deviation from the common type of humanity, and nature avenges the aberration by denying it permanency and inflicting upon it abnormality. Whether degeneration or progression, genius is unusual and unstable. But one thing distinguishes genius from mental alienation, and it is this—that genius possesses the power of inhibition, of concentration, of *critique*, and far-sightedness, while demency has no control of the ideas it has formed; both possess the swift and unerring power of origination; the one can command what it has originated, the other cannot.

It must be admitted that the method employed for the verification of this thesis, is not absolutely safe. Wherever an eccentricity in a man of genius is found, it is accredited to psychosis, even though the genius in question be upon the whole more normal than the average "normal" man; as, for instance, Goethe. If the same method were applied to all men, would not normality be the exception and abnormality the rule? μκρκ.

DAS BEWUSSTSEIN UND SEIN OBJECT. By *Dr. Joh. Wolff*, Professor of Philosophy at the University of Freiburg (Switzerland). Berlin: Mayer & Müller.

This is a huge closely printed volume of six hundred and twenty pages. It is the enlargement and development of a treatise offered several years ago to the faculty of the University of Bonn, upon application by Dr. Wolff for a University instructorship, and contains the results of the author's thoughts and researches since that time upon the subject there dealt with.

Among many valuable isolated speculations and suggestions, we find fundamental theses with which it is impossible for us to agree. Thus, Dr. Wolff says that when he speaks of soul he means 'a substance, a substratum, a vehicle, a cause of psychical phenomena, and not a phenomenon or sum of phenomena'; and he says it is no more a pre-judgment or prejudice on *his* part to begin with this thesis than it is on the part of those who hold a different view to begin with the opposed one,—in fact less so, since he starts from the notion which all men hold in common, while the others do not.

Does the mathematician, in propounding a new method, or a physicist in explaining an unsolved problem, proceed from the mathematical and physical notions all men hold in common? And if the soul is made an object of scientific research, why should an exception be made of *it?* It is not so much what we begin with as what we end with, and it is perhaps superfluous to say that Dr. Wolff has ended where he began—with the simplicity, the substantiality, the unity, and the permanency of the ego. μκρκ.

PHILOSOPHY IN AMERICAN COLLEGES AND UNIVERSITIES.

WE had originally intended, in this first number of *The Monist*, to present to our readers a comprehensive statement of the courses announced by American Universities in the departments of Philosophy, Ethics, and Psychology; first, in order to supply students proposing to pursue these studies and others interested, with information at first-hand, and secondly to give the non-academic world, which is considerable, an insight into what our higher professional schools are doing in these branches.

Since then *The American Journal of Psychology* has published a very full and gratifying account of the state of psychological research in our Universities, made up of the reports of the professors at the head of these departments; and we therefore refer our readers for information regarding this branch to the article entitled "Psychology in American Universities," published in Vol. III, No. 2, of that ably-conducted magazine.

It was also difficult to obtain the required information: most of our professors, in the last few months, having been absent from the university towns.

But reports from the most representative universities in different parts of the country have been obtained. They are intended merely to exhibit the general nature and extent of philosophical instruction in America and do not profess to be complete.

* * *

A review of the Registers, Catalogues, and Programmes of a large number of our colleges has led us to the conviction that the acquiring in America of a broad philosophical training is not the fault of the *professions* of our academical authorities. The courses offered are set forth in our college catalogues at very great length; they are very exhaustive; and their specification is accompanied with analyses of the work of the various departments and with bibliographical schedules that in point of thoroughness leave nothing to be desired. This fulness of exposition is noticeable in all the departments.

But under the obligatory system of study, the separate departments, or rather the professions of the separate departments, must certainly conflict: and the question arises in the mind of the observing outsider, To which is justice done?

And, except where a specialty is exclusively followed, wherein under the professed conditions, does the elective system differ from the obligatory? Only that in the one case, the student is made the author of his embarrassment, and in the other the victim of it. However, in the absence of a decided educational sentiment in our nation, and in the lack of a uniformity of opinion as to what must be *demanded* of our schools instead of a submissive acquiescence in what they give us, the question whether a college has fulfilled what it has professed, must be left to the faithful individual student who is forced to devote the best years of his life to the solution of it. It seems impossible to determine it otherwise. And yet, except in the case of our foremost institutions, to which all of us cannot go, this is true.

We have observed, too, that the extension of the departments of philosophy proper is not keeping pace with that of many other departments—as, for instance, the departments of history and economics.

Perhaps this is inevitable; the last-mentioned sciences having been until of late very much neglected.

But the tendency threatens to overbalance the curriculum; and where pretensions to universality are made, it is not justified.

On the other hand, the firm hold that experimental psychology has obtained in some of our foremost schools, is gratifying; though enthusiasm may also lead too far in this direction.

Lack of co-operation in cognate branches is, with very few notable exceptions, universal. Preparatory training is not emphasised. At least, where so much is said of the character and method of instruction, and where the elective system prevails, we should expect some mention of it. But it is not found.

Philosophy would seem to be something that is to be obtained only in the lecture-rooms of the "philosophical department," and in most cases it is sought nowhere else. The study of Mathematics, Physics, Natural Science, and Philology, is greatly neglected. Philosophy becomes an aim and a means in itself, and the student at the close of his course often discovers himself in the quest of philosophy, but with no means of finding it.

This necessity of co-operation has been fully recognised, for instance, at Harvard. "When a student applies for Honors," says Professor Palmer, "we require from him not merely an acquaintance with technical philosophy but *also with the subjects most nearly adjacent to the special philosophical field he has chosen.*"

And so it is in other of our advanced and enlightened schools. Yet in the majority of cases, the *foundations* of philosophical culture are not insisted upon, but left to chance and the uncertainties of a universal elective curriculum.

Lastly, philosophy at some institutions exhibits a sectarian and theological complexion.

This, one thinks, might be left to the theological seminaries. But it is not.

We have Baptist Philosophy, and Presbyterian Philosophy, and denominational philosophies of divers other descriptions.

A president of a prominent Eastern University, (a gentleman to whom the philosophic spirit of this country is greatly indebted for inspiration and expansion,) has taken,—let it be remarked in this connection,—a much more liberal step, and urged the necessity of establishing a school of *American* Philosophy.

This is laudable; and in harmony with the present resuscitation of American patriotism in———matters of learning.

It was this spirit that dictated the witty proposition of a Chicago gentleman to found a "school" of American *Geometry*.

* * *

We hope that the appended syllabuses of courses in philosophy will afford a general idea of the scope of philosophical teaching in America. The professors who have supplied us with the information we requested, we thank for their courtesy and obligingness.

UNIVERSITY OF MICHIGAN.

The Philosophical Courses of the University of Michigan may be conveniently classified under three heads:—

I. BEGINNING.

1. ELEMENTARY LOGIC, in which there are two courses, one general covering the rudiments of syllogistic and deductive logic in which Jevons is used as the basis, the other in inductive logic, intended especially for scientific students, in which Fowler is used.

2. ELEMENTARY PSYCHOLOGY. The main facts regarding modern scientific researches and methods, and the various attempts at their philosophic interpretation. Dewey's Psychology is the book used in connection with this course.

3. INTRODUCTION TO PHILOSOPHY. A course of lectures on the main problems and principles of the theory of knowledge and reality. Each of the foregoing courses is for one semester.

II. INTERMEDIATE COURSES.

1. HISTORY OF PHILOSOPHY. Ancient and Modern. Lectures and readings designed to give information regarding both the historical development of thought, and the main problems developed in its course. The department of philosophy owns a large number of copies of the chief thinkers in modern philosophy, Locke, Descartes, etc., etc., and these are assigned to members of the class for readings and reports. Each student thus becomes acquainted with at least half-a-dozen of the leading writers at first-hand.

The course runs through the year.

2. ETHICS, THEORETICAL (one-half year) AND SOCIAL (Political Philosophy, one-half year also). The theoretical course attempts to arrive at an account of the ethical ideal by means of a critical consideration of the principal modern ethical theories, especial attention being paid to Utilitarianism, Evolutionary Ethics, and Kantianism. The second division of the course discusses the ethical basis and value of society and the state, law and rights, in connection with an account of the political theories of Plato, Aristotle, Grotius, Hobbes, Locke, Kant, Rousseau, Hegel, etc

3. ÆSTHETICS. This course, like the previous one, unites the historical and theoretical treatment of æsthetic doctrines and results. It is designed largely to aid students in the interpretation and criticism of literature. It is a half-year course, and is followed by a half-year course (given in the English Department) on the Principles and Methods of Literary Criticism.

4. PHYSIOLOGICAL PSYCHOLOGY. Lectures, assigned readings and elementary experiments, and demonstrations. There is established, as yet, no separate psychophysical laboratory, but the new-equipped physiological laboratory of the University is, through the courtesy of the Professor of Physiology, at the disposal of students in this line. Half-year course.

5. SCIENCE AND PHILOSOPHY OF RELIGION. Lectures, readings, etc., designed to give an account of the chief methods employed and results achieved in the modern historical and comparative study of religions. And also an account of the principal theoretical interpretations of religion. Half-year course.

III. ADVANCED COURSES.

1. KANT'S CRITIQUE OF PURE REASON. A study of Kant's masterpiece at first-hand. This is accompanied by a shorter subsidiary course, treating of the development of the Kantian system, and criticisms upon it. Caird's Critical Philosophy of Kant, is read and discussed in connection with the latter course. Half-year course.

2. HEGEL'S LOGIC. A study of Wallace's translation of the lesser Logic of Hegel. Half-year course.

3. THE LOGIC OF SCIENTIFIC METHODS. A lecture course taking up the study of the Logic of Science, and intended to make the hearers acquainted with the standpoint and spirit of such authors as Lotze, Sigwart, Wundt, Mill, Jevons, Bradley, Bosanquet, and the modern movement in logic generally. Half-year course.

4. PROBLEMS IN HIGHER ÆSTHETICS. A brief course for graduate students in Æsthetics.

5. SEMINARY IN ETHICS. Discussion of the treatment of some main ethical problems by the chief modern ethical writers.

The Elementary courses are conducted mainly by text-books and recitations; the Intermediate courses by lectures and assigned readings, reports and essay-writings. The Advanced courses are pursued by class discussions, conversations, etc. on basis of work done independently by the student.

The teaching is carried on by John Dewey, J. H. Tufts, and F. N. Scott.

JOHN DEWEY.

HARVARD UNIVERSITY.

The courses at Harvard are, we believe, the most complete offered in any American University. They consist (for 1890–91) of four groups:

I. INTRODUCTORY COURSES.

IN LOGIC, METAPHYSICS, AND PSYCHOLOGY.

II. SYSTEMATIC COURSES

PSYCHOLOGY, COSMOLOGY, ETHICS, PHILOSOPHY OF RELIGION, THE PSYCHOLOGICAL BASIS OF RELIGIOUS FAITH, AND THE CONTENT OF CHRISTIAN FAITH.

III. HISTORICAL COURSES.

Including lectures on COMPARATIVE RELIGION, GREEK PHILOSOPHY, DESCARTES-SPINOZA-LEIBNITZ, ENGLISH PHILOSOPHY FROM HOBBES TO HUME, THE MOVEMENT OF GERMAN THOUGHT FROM 1770–1830, CONTEMPORARY SYSTEMS AND APPLIED ETHICS.

IV. COURSES OF ORIGINAL RESEARCH.

Including the Psychological, Metaphysical, and Ethical Seminaries. These do not include the additional and auxilliary courses in other subjects, which are required for Honors.

"Holding that there is one best way for the young student to begin his philosophical study," says Prof. G. H. Palmer, "we have planned a single introductory course and have given it variety by setting three instructors to teach it. When these elementary matters have been mastered, we offer the student a choice among half-a-dozen dogmatic courses, or among as many more historical. These last two sets of courses are open alike to graduates and to undergraduates. For graduate specialists three or four lines of Seminary work are provided, with a view to giving the most advanced students ample opportunity to develop their individual powers. . . . . But the chief aim of our Honors is to test powers rather than acquirement."

In Harvard there are six instructors engaged in the department of philosophy alone: Prof. G. H. Palmer, Prof. C. C. Everett, Prof. W. James, Prof. F. G. Peabody, Prof. J. Royce, and Dr. G. Santayana. A dozen or more courses of philosophical content are offered, and acquaintance with auxilliary branches is necessary to take Honors.

UNIVERSITY OF CALIFORNIA.

The instruction given in the various branches of philosophy at this institution is conducted according to the following scheme:

1. PROPÆDEUTIC TO PHILOSOPHY. Empirical psychology, including formal logic, deductive and inductive. Four times a week.

2. INTRODUCTION TO PHILOSOPHY. History of European philosophy, in outline. Four times a week.

3. ELEMENTARY ETHICS, INCLUDING CIVIL POLITY. Sketch of the history of ethical and political theories; critique of the conflict between perfectionism and hedonism; freedom and necessity, optimism and pessimism; investigation of the nature of a state, and of its bearing on the limits of liberty and allegiance. Four times a week.

4. FIRST ALTERNATING COURSE. Exposition of some principal movement or conflict in the history of philosophy, by a critical study of its leading participants; or the like, the subject being changed from year to year. Twice a week.

5. SECOND ALTERNATING COURSE. Some additional topic, similar to that of Course IV., and similarly changed, but drawn, preferably, from the field of practical philosophy. Four times a week.

6. GRADUATE COURSE. First-hand study of certain philosophic masterpieces, such as Plato's *Parmenides*, *Theætetus* and *Sophist*, Aristotle's *De Anima*, Kant's *Kritiken*, or Hegel's *Phœnomenologie des Geistes*; etc. Four times a week throughout the year.

Courses 1, 2, and 3, in this scheme are permanent, and are repeated from year to year in substantially the same form; Course 4 is continued throughout a whole

year; the rest throughout a single term. Courses 4 and 5 are projected with the intention of furnishing a variety of topics, a new one being usually presented each year; though a subject is sometimes continued, if it proves to excite the special interest or meet the particular wants of the incoming Senior class. Course 6, provided for graduate students only, is sufficiently described in its sub-title.

The specific subjects for the ensuing year 1890–91, under these courses with varying topics, will be as follows:

Course 4. PHILOSOPHY FROM KANT TO HEGEL. The Development of Rationalistic Idealism, from its negative and partial to its complete and positive form. Twice a week.

Text-Books: (1) Watson's Philosophy of Kant; (2) Everett's Fichte's Science of Knowledge; (3) Watson's Schelling's Transcendental Idealism; (4) Caird's Hegel; (5) Hegel's Logic, translated by Wallace. With the standard works of reference.

Course 5. HIGHER ETHICS. Based on a criticism of Sidgwick and Martineau. Four times a week during the second term.

Text-Books: (1) Sidgwick's Methods of Ethics; (2) Martineau's Types of Ethical Theory.

Course 6. GRADUATE COURSE. The Dialektik and Methodenlehre in Kant's Kritik, followed by Hegel's Lesser Logic in Wallace's translation. Four times a week throughout the year.

From this statement it will be seen that some important text covering each topic is in the hands of each student. The object of this is to furnish an actual historical basis for the discussion of the subject, which is conducted by the professor's lectures. These proceed from a criticism, partly appreciative, partly destructive, of the texts chosen, to a constructive and positive presentation of the subject, according to the reasoned views of the lecturer.

The interest in philosophical studies is steadily increasing in this institution. The instruction in them was opened in the academic year 1884–85, and the growth of interest is well indicated by the fact that the number of students now annually electing these courses is more than double the number during the first and second year.

G. H. HOWISON.

UNIVERSITY OF PENNSYLVANIA.

THE Courses offered in Logic, Psychology, Ethics, and Philosopny, at this institution for the year 1890–91, are as follows:

UNDERGRADUATE COURSES.

1. AN ELEMENTARY COURSE IN LOGIC. Two hours a week.
2. THE ELEMENTS OF PSYCHOLOGY. One hour a week.
3. SCIENTIFIC METHODS IN PSYCHOLOGY. Lectures with Laboratory Work. Two hours.
4. EXPERIMENTAL PSYCHOLOGY. Lectures with Laboratory Work. Two hours.
5. A COURSE IN ETHICS. Two hours.
6. A COURSE ON THE PHILOSOPHY OF ETHICS. One hour.
7. A COURSE ON THE HISTORY OF PHILOSOPHY. Two hours.
8. A COURSE ON THE DEVELOPMENT OF IDEALISM. Two hours.

GRADUATE COURSES.

1. COMPARATIVE, SOCIAL, AND ABNORMAL PSYCHOLOGY. Two hours.

2. SPECIAL PSYCHOLOGICAL PROBLEMS. Lectures with Laboratory Work. Two hours.

3. ADVANCED PSYCHOLOGY. Two hours.

4. ETHICAL THEORIES. One hour.

5. HISTORY OF MODERN PHILOSOPHY. Two hours.

Each course of undergraduate lectures will extend through half the year. Courses 1, 2, 3, and 7, will be delivered during the first term; Courses 4, 5, 6, and 8 during the second. Of the graduate lectures, Courses 1 and 2 will be given during the first and second terms respectively. Courses 3, 4, and 5 will extend throughout the year. The psychological laboratory is open at all hours to students engaged in special researches.

In addition to these courses, mention may be made of those delivered on Physiological, Abnormal, and Comparative Psychology in the Biological and Medical Schools of the University; and of the numerous courses, more or less directly ethical, which are delivered in the field of Sociology. In several of these there is a purposed effort to bring out the significance for ethics of the subject treated.

GEO. S. FULLERTON.

CLARK UNIVERSITY.

From the well-classified and thorough courses offered at Clark University, (conducted by Dr. Hall, Prof. Donaldson, Dr. Sanford, Dr. Boas, Dr. Cook, Dr. Strong, and others,) we select, for its uniqueness, an account of the instruction at that institution in—

APPLIED ETHICS.

Under this head, come among others, the different forms of abnormal and pathological humanity. The most extreme form is treated of in Criminal Anthropology, which takes up the study of man as criminal. As an introduction, the acts that would be considered criminal in man's case, are investigated, as they appear in the whole realm of nature. This division we call Criminal Embryology.

The other divisions to be considered in the lectures are: the Anthropometry, Craniology, Physiognomy, Cerebrology, Psychology, Sociology, Teratology, and Prophylaxis of criminals; also criminality in relation to Psychiatry and Psychiatrical Anthropology. The general relation of Ethics to Criminal Anthropology, is one of degree; crime being an exaggerated form of wrong. We can illustrate the method of application in this way: If a nerve of a normal organism is cut, the organs in which irregularities are produced, are those which the nerve controls. In this way the office of a nerve in the normal state may be discovered. The criminal is, so to speak, the severed-nerve of society; and the study of him is a very practical way (though indirect) of studying normal men. And since the criminal is seven-eights like other men, such a study is also a direct inquiry into normal humanity.

The lesser degrees of abnormal and pathological cases will be discussed under the head of Charitology. These are represented by the different kinds of benevolent institutions, such as almshouses, asylums for the insane, imbecile, and epileptic; for the deaf, dumb, and blind; hospitals, dispensaries, and infirmaries; homes for truants, orphans, and for the friendless and aged.

The characteristics of inmates of such institutions and the methods of treatment and prevention, will be the main considerations. The facts gathered, and the principles underlying such institutions, will be utilised in an attempt to give a

scientific basis to ethics. The problems of right, duty and freedom, will be carefully considered.

Accepting the sociological truism, that the community is more important than any individual in it, the ethical standpoint of the lecturer is: *that the idea of wrong depends upon the moral, intellectual, physical or financial danger or injury, which a thought, feeling, willing or acting, brings to humanity.*

The decision, as to what thoughts, feelings, actions, etc., are dangerous or injurious, will depend upon the results from the application of the scientific method to the different departments of knowledge.

The direct practical object of the course, will be the study of preventatives, based on a thorough diagnosis.

Visitations and practical investigations of charitable and penal institutions will be made as occasion shall offer.

The lectures will be delivered in the latter part of the year.

ARTHUR MACDONALD.

UNIVERSITY OF WISCONSIN.

Besides the comprehensive courses in psychology, the following are offered:

1. HISTORY OF GREEK PHILOSOPHY. A brief survey of the development of philosophical thought in Greece. Zeller's Hand-book of Greek Philosophy is the reference book. Twice a week. Elective. (Prof. Jastrow.)

2. THE HISTORY OF MODERN ENGLISH PHILOSOPHY. Three times a week. Elective. (Prof. Stearns.)

3. ETHICS. Four times a week. Elective. (Prof. Stearns.)

4. ÆSTHETICS. In addition to the study of the physiological and psychological basis of æsthetics an elementary knowledge of the history of art and the principles of art criticism is given by lectures and discussions. Five times a week. Elective. (Prof. Stearns.)

5. ELEMENTARY LOGIC, DEDUCTIVE AND INDUCTIVE. The analysis of arguments, the construction and elaboration of syllogisms; the symbolic and diagrammatic methods of representing logical operations, and modern and ancient systems of logic will form the main topics of the deductive logic; while in inductive logic special emphasis will be laid upon the methods of scientific reasoning, the logic of chance, the detection of fallacies, and the estimation of evidence. Daily in winter term. (Prof. Jastrow.)

6. ADVANCED LOGIC. Special attention paid to the logic of the sciences; to mathematical logic as introduced by Boole and developed by Venn, Peirce, Schroeder and others; to the theory of probabilities, and the history of logical doctrines. Twice weekly. Elective. (Prof. Jastrow.)

7. MILL'S LOGIC. A general course upon the philosophy of reasoning and the principles of inductive science. Killick's Handbook to Mill's Logic used. Three times weekly. (Prof. Jastrow.) Each course extends over a single term only.

In Ethics an effort is made to introduce the students to three phases of the subject, the historical, theoretical, and practical. The first is at present limited to a brief review, by lectures, of the chief English ethical theories. In the second Prof. Fowler's Progressive Morality is made the basis of the instruction. The third is pursued chiefly in the form of topics, relating generally to current ethical questions, which are assigned for special study to members of the class, and their presentation is, when desirable, made the basis of general discussion.

J. W. STEARNS.

BOSTON UNIVERSITY.

The following are the courses for the present year, at Boston University, under the direction of Prof. B. P. Bowne and Dean Huntington.

PSYCHOLOGY. Thought studied as a fact; its forms and laws investigated; Current Theories expounded and criticised. Five hours.

LOGIC. Thought studied not as a fact, but as an instrument of knowledge. Investigation of the laws, forms, aims, and methods of mental activity. Five hours.

THEORY OF KNOWLEDGE. The study of thought as a process supplemented by the study of knowledge as its product. Knowledge defined, and the conditions, subjective and objective, of its validity investigated. The claims of scepticism, agnosticism, etc., considered at length. Three hours.

METAPHYSICS. Modifications of ontological and cosmological ideas in the light of rational criticism. Four hours.

PHILOSOPHY OF THEISM. The logical value and foundation of Theism considered. Four hours.

HISTORY OF ETHICAL THOUGHT. Christian Ethics. Text-book and lectures. Five hours.

PHILOSOPHY OF ETHICS. Critical and constructive review of ethical theories. Psychological questions as to the nature and origin of moral faculty ruled out as irrelevant. Two hours.

HISTORY OF PHILOSOPHY. From Descartes to the present time. Five hours.

The Philosophical Club, organised in 1886, has since that time maintained stated meetings for the furtherance of its members in philosophical studies.

Last year, under the auspices of the University, a special course of five lectures on Educational Psychology was given before large audiences by William T. Harris, LL. D. The topics treated were as follows:

1. Introspection contrasted with external Sense Perception.
2. Mental Pictures *versus* General Ideas.
3. The Logical Constitution of Sense Perception.
4. Physiological Psychology.
5. The Psychology of Mathematics, Æsthetics, and Ethics.

The courses are for single terms only. B. P. BOWNE.

JOHNS HOPKINS UNIVERSITY.

The Undergraduate instruction in philosophy provides five hours a week of required work for one year:

1) IN DEDUCTIVE AND INDUCTIVE LOGIC; 2) IN PSYCHOLOGY; 3) IN ETHICS.

The courses are unified and thorough. A voluntary course in the History of Philosophy is given; and advanced courses will be offered this year in Modern Philosophy from Descartes to Kant, and in English Ethics from Hobbes to Stephen. The instructors are Professors Griffin and Emmot.

PERIODICALS.

MIND. July 1890. No. LIX.

CONTENTS:

OUR SPACE-CONSCIOUSNESS. A Reply. By *Herbert Spencer.*

VOLKMANN'S PSYCHOLOGY (I). By *Thomas Whittaker.*

THE LOGIC OF THE ETHIC OF EVOLUTION. By *William Mitchell.*

THE ANTINOMY OF THOUGHT. By *Alexander F. Shand.*

MENTAL TESTS AND MEASUREMENTS. By Prof. *J. McK. Cattell.*

DISCUSSION: 1) The Evolution of Inductive Thought. By *Hiram M. Stanley.* 2) The Genesis of the Cognition of Physical Reality. By *Julius Pikler.*

CRITICAL NOTICES: "Fouillée's L'Avenir de la Métaphysique fondée sur l'Expérience"; Tarde's "Lois de l'Imitation"; Bæumker's "Das Problem der Materie in der Griechischen Philosophie."

SOME NEWLY-DISCOVERED LETTERS OF HOBBES. By the *Editor.*

Our Space-Consciousness. In this article Mr. Herbert Spencer replies to criticisms, by adherents of Kantian doctrine, of objections contained in §§ 326–335 of *The Principles of Psychology*. He objects that the disciples of Kant "cannot imagine how it is possible that our space-consciousness can have arisen out of that which was not originally a space-consciousness."

Volkmann's Psychology. Shows that the really important point in Volkmann's doctrine of "psychological mechanism" is its theory of the interaction of contemporaneous presentations, and of the existence among them of unconscious presentations. Herbartian psychology is strictly scientific system, but when its superfluous mechanism is cleared away, its explanations become those of associationism.

In *The Logic of the Ethic of Evolution*, Mr. William Mitchell points out that the two conditions of an ethical end are that it be the motive of individual action, and that it furnish a critical system of universal laws; and further that those conditions are fulfilled by the end variously propounded in the ethic of evolution only if it be represented, not as an external limit forcing itself on men, but as presenting a more desirable character and medium to the individual than any other. The end and means of moral progress given by the Ethic of Evolution are perfectly true, but they do not express the essence of the matter.

The Antinomy of Thought. This paper investigates an antinomy which infects all our thought of reality that is not intuitive. The source of error is the confusion of the judgment with the consciousness or intuition of reality.

In the article on *Mental Tests and Measurements*, Prof. J. McK. Cattell describes certain tests which are used in the Psychological Laboratory of the University of Pennsylvania, with the object of providing data for the discovery of the

rules which govern the constancy of mental processes, their interdependence, and their variations under different circumstances.

The Evolution of Inductive Thought. A primary element in all experience is its inductive quality. The struggle of existence awakens experience to the thought-stage where it knows and directs itself, but this very slowly. Development precedes self-development, and this precedes a self-development which is self-conscious. This conclusion is confirmed by some analyses of thought in the divisions of conception, judgment, and reasoning.

The Genesis of the Cognition of Physical Reality. This is a criticism by Mr. Julius Pikler of Mr. Stout's criticism on Mill, which appeared in the January number of *Mind*. His opinion is that Mr. Strong's statements are simply negations of Mill's theory, and as such prove nothing.

Some newly-discovered Letters of Hobbes. These letters, seventeen in number, were written to the French physician Sorbière, and have been discovered by Dr. F. Tönnies in the National Library at Paris. All of them, with related letters of Sorbière and others, are given at length in the *Archiv f. Gesch. d. Phil.* iii. 58-71, 192-232, and the first nine, which are the only ones of real importance, are set out in this number of *Mind*. They have reference to the important period of Hobbes's life and work that led up to *Leviathan* in 1651. (London: Williams & Norgate.)

REVUE PHILOSOPHIQUE. No. 175. July 1890.

CONTENTS:

L'HOMOGENEITE MORALE. By *G. Fonsegrive.*

CONTRIBUTIONS PSYCHO-PHYSIQUES A L'ETUDE ESTHETIQUE (fin). By *G. Sorel.*

LA FOLIE DE J. J. ROUSSEAU. By *H. Joly.*

LA PERCEPTION DES LONGUEURS ET DES NOMBRES CHEZ QUELQUES PETITS ENFANTS. By *Alfred Binet.*

ANALYSES ET COMPTES RENDUS.

M. Fonsegrive in *L'Homogénéité morale* points out the necessity of a proper system of education for developing in the mind of the young a moral homogeneity to replace the heterogeneity which psychologists find in the nature of man.

In *Contributions psycho-physiques a l'Etude esthétique*, M. G. Sorel continues his studies on the psychology of æsthetics, and concludes that experimental psychology and especially psycho-physics form the base of practical æsthetics.

M. H. Joly in *La Folie de J. J. Rousseau* points out that the problem of the agreement of genius with insanity, so far as concerns Rousseau, is reduced to small dimensions.

La Perception des Longueurs et des Nombres ches quelques petits Enfants by M. Alfred Binet, describes certain original experiments which indicate that young children have an accurate perception of differences in length, but that their perception of number is very limited. (Paris: F. Alcan.)

REVUE PHILOSOPHIQUE. No. 176. August 1890.

CONTENTS:

LES ORIGINES DE LA TECHNOLOGIE. By *A. Espinas.*

L'INHIBITION DANS LES PHENOMENES DE CONSCIENCE. By *A. Binet.*

LA GEOMETRIE GENERALE ET LES JUGEMENTS SYNTHETIQUES A PRIORI. By *G. Lechalas.*

ANALYSES ET COMPTES RENDUS.

REVUE DES PERIODIQUES RUSSES.

CORRESPONDANCE: "Les Manuscrits de M. de Biran."

In *Les Origines de la Technologie* M. Espinas aims at giving a history of philosophy in action. The present paper is devoted to physico-theological technology, and concludes with the observation that it was undoubtedly a progress to conceive the technical arts as a whole, as a divine gift in like manner as the fruits of the earth and the beneficent phenomena of *nature*, since this conception by opposition gave rise to the idea of *art*, that is of human initiative acting differently according to diversity of circumstances.

In *L'Inhibition dans les Phénomènes de Conscience* M. Alfred Binet explains certain phenomena by showing that under various circumstances certain images and sensations cannot coexist with others in the same field of consciousness; the presence of one excludes that of another. Antagonism and exclusion are the two simple facts which explain the phenomena in question.

La Géométrie Générale et les Jugements Synthétiques a priori is a reply by M. G. Lechalas to an article by M. Renouvier in the *Critique Philosophique* criticising M. Calinon's theory of geometrical spaces embodied in the system of "general geometry." While showing that spaces with three dimensions are rationally included in a space with four dimensions, M. Lechalas recognises the impossibility of establishing such a geometry, seeing that we have no figure that answers to what a four-dimensional space would be, as well as the purely formal character of the presentations of non-Euclidian figures. (Paris: F. Alcan.)

ZEITSCHRIFT FÜR PSYCHOLOGIE UND PHYSIOLOGIE DER SINNESORGANE. Vol. I, No. 2.

CONTENTS:

UEBER DIE WAHRNEHMUNG UND LOKALISATION VON SCHWEBUNGEN UND DIFFERENZTÖNEN. By *Carl L. Schaefer.*

DIE ASSOCIATION SUCCESSIVER VORSTELLUNGEN. By *H. Münsterberg.*

BRIEFE VON G. TH. FECHNER: UEBER NEGATIVE EMPFINDUNGSWERTE. (Concluded.) Edited by *W. Preyer.*

LITERATUR-BERICHT.

The results of Mr. Schaefer's researches are that for the localisation of the vibrations of two tones, in the case of their unequal relative intensity, the direction and distance of the relatively louder tone are determinate. If the relative intensity of the primary tones is equal, the vibrations are heard to proceed from the region between the two sounding points. Differential tones are heard between the ears, when the sounding sources are in the median plane; but when both primary tones come from the same side, in or immediately before the ear on that side; and in case of unequal intensity, when both come from different sides, on the side of the softer sound.

Prof. Münsterberg concludes that there is no *successive* association of ideas; when successively appearing, they are received singly into the memory.

The letters of Fechner are continued from No. 1.

ZEITSCHRIFT FÜR PSYCHOLOGIE UND PHYSIOLOGIE DER SINNESORGANE. Vol. 1, No. 3.

CONTENTS:

UEBER DIE KLEINSTEN WAHRNEHMBAREN GESICHTSWINKEL IN DEN VERSCHIEDENEN TEILEN DES SPEKTRUMS. By *W. Uhthoff.*

Die Æsthetischen Gefuehle. By *A. Döring.*
Besprechungen: (1) A. Mosso's und A. Maggiora's "Ueber die Gesetze der Ermüdung." (2) Münsterberg's "Beitraege zur Experimentellen Psychologie."
Literatur-Bericht.

Dr. Uhthoff, in order to determine the least visual angle of perception, has employed a grating in a pure-monochromatic spectral field. His results were that the angles in the different parts of the spectrum are essentially equal.

Æsthetic emotions, Mr. Döring contends, proceed from the unhindered play of the functions of psychical faculties; their contrary, from the inhibition of the same.

This periodical is edited by H. Ebbinghaus and A. König, with H. Aubert, S. Exner, H. v. Helmholtz, E. Hering, J. v. Kries, Th. Lipps, G. E. Müller, W. Preyer, and C. Stumpf as collaborators. It appears every two months. The review of the literature of its special department of research is very comprehensive. (Hamburg and Leipsic: L. Voss.)

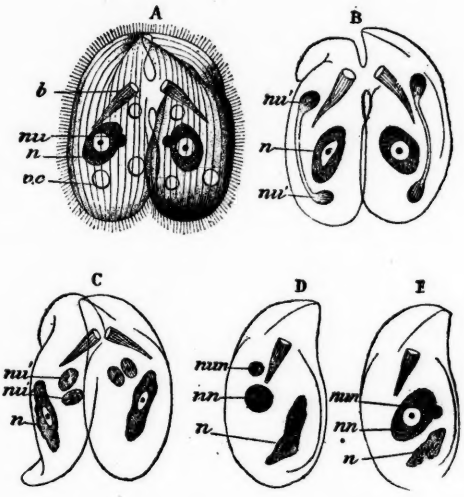
LA NUOVA FILOSOFIA.

Ragioni e Ideali. By *La Direzione.*
La sensazione e la sua conoscibilita. By *R. Ardigo.*
J. E. Alaux's Le probleme religieux au XIXe siècle. By *A. Torre.*
Economia scientifica ed economia utopista. By *A. Loria.*
P. Leroy-Beaulieu's L'Etat moderne et ses fonctions. By *F. S. Nitti.*
C. Jannet's Le socialisme d'Etat et la reforme sociale. By *F. S. Nitti.*
Lombroso's and Laschi's Il delitto politico e le rivoluzioni. By *G. Fioretti.*
Critica Letteraria.
A. Angiulli—A. Saffi—F. Petruccelli della Gattina. (Memorie.) By *A. Torre.*
La Politica.
Questioni e Problemi. La responsabilità filosofica, secondo *Paolo Janet.*

This is the first number of *La Nuova Filosofia* which is established, under the editorship of Dr. Andrea Torre, to diffuse in Europe and America the best results of contemporary culture, in relation especially to the life and development of society. (Naples: Dr. Andrea Torre, Vico Lungo Avvocata, 66.)

APPENDIX.

Cut exhibiting modifications that affect the accessory nucleus. Referred to on page 26 of this number of *The Monist*, in M. Binet's article "The Immortality of Infusoria."



CONJUGATION OF CHILODON CUCULLULUS.

A, beginning of conjugation; *b*, mouth; *n*, nucleus; *nu*, nucleolus; *v. c.*, multiple contracticle vesicles.

B, division of the nucleolus into two segments, *nu'*, *nu'*; the nucleus *n* begins to show signs of regression.

C, each of the two individuals in conjugation contains two nucleolar segments, brought near together, of which one probably comes from the individual opposite by course of exchange, and will fuse with the segment not exchanged, to form a compound segment (Maupas).

D, division of the segment into two portions which grow to unequal sizes; the larger, *nn*, will become the new nucleus, the smaller, the nucleolus of the new formation, *nun*.

E, the old nucleus, *n*, reduced to a small pale and rumpled mass, is replaced by the new nucleus *nn*, near by which is seen the new nucleolus *nun*.